SCHOOLS AND HOSPITALS
ENERGY MANAGEMENT PROGRAM REPORT

For

Lackland ISD
2460 Kenly Avenue
San Antonio, Texas 78236-1244
(210) 357-5000

Administered By:

SECO
State Energy Conservation Office

COMPTROLLER OF PUBLIC ACCOUNTS
STATE ENERGY CONSERVATION OFFICE (SECO)
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Prepared By:

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ENERGY STAR PARTNER

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Schools & Hospitals Energy Management Program
Lackland Independent School District
2460 Kenly Avenue
Lackland Air Force Base, Suite #8265
San Antonio, Texas 78236-1244
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Phone: (210) 357-5005

1.0 EXECUTIVE SUMMARY

Lackland Independent School District, now referred to as the District, requested that Texas Energy Engineering Services, Inc. (TEESI) perform a Preliminary Energy Assessment (PEA) of their facilities. This report documents that analysis.

This service is provided at no cost to the District through the Schools and Hospitals Energy Management and Technical Assistance Program as administered by the Texas Comptroller of Public Accounts, State Energy Conservation Office (SECO). This program promotes and encourages an active partnership between SECO and Texas schools for the purpose of planning, funding and implementing energy saving measures, which will ultimately reduce facility energy bills.

The annual cost savings, implementation cost estimate and simple payback for all building energy retrofit projects identified in this preliminary analysis are summarized below. Individual building projects are summarized in Section 7.0 of this report.

Implementation Cost Estimate:	$231,300
Annual Energy Cost Savings:	$45,330
Simple Payback:	5.1

Recommendations and information of interest to the District is provided in this report regarding Energy Consumption and Performance (Section 3.0), Energy Accounting (Section 4.0), Senate Bill 12 and House Bill 3693 Overview (Section 5.0), Recommended Maintenance & Operation Procedures (Section 6.0), Retrofit Opportunities (Section 7.0), Funding Options (Section 8.0), Capital Improvement Projects (Section 9.0), and Energy Management Policy/Plan (Section 10.0). A follow-up visit to the District will be scheduled to address any questions pertaining to this report, or any other aspect of this program.

SECO is committed to providing whatever assistance the District may require in planning, funding and implementing the recommendations of this report. The District is encouraged to direct any questions or concerns to either of the following contact persons:

SECO / Ms. Glenda Baldwin	TEESI / Saleem Khan
(512) 463-1731	(512) 328-2533

2.0 FACILITY DESCRIPTIONS

This section provides a brief description of the facilities surveyed. The purpose of the onsite survey was to evaluate the major energy consuming equipment in each facility (i.e. Lighting, HVAC, and Controls Equipment). A description of each facility is provided below. Please reference **Appendix C-1** for building grouping.

Group 2: Elem. 1- 2

Buildings:	8220, 8224, 8226, 8228, 8230, 8232
Stories:	Single story buildings
Area:	40,309 SF
Bldg. Components:	Brick buildings, flat modified bitumen roof, slab on grade
Typical Lighting Fixtures:	Bldg. 8220 –T12 fluorescent fixtures with magnetic ballasts and T8 fluorescent fixtures with electronic ballasts Bldgs. 8224, 8226, 8228, 8230, 8232 – T8 fluorescent fixtures with electronic ballasts
HVAC:	Bldgs. 8220E, 8224, 8228, 8232 – Air-cooled chiller system with electric heat Bldgs. 8226, 8230 – No HVAC Bldg. 8220W – Packaged rooftop units
Controls:	EMS, Manufacturer: Johnson Controls

Group 3: Pre-k, Elem Gym

Buildings:	8218, 8218E, 8222
Stories:	Single story buildings
Area:	44,145 SF
Bldg. Components:	Brick buildings, pitched metal roof, slab on grade
Typical Lighting Fixtures:	Bldg. 8218 – T12 fluorescent fixtures with magnetic ballasts Bldg. 8218E – T8 fluorescent fixtures with electronic ballasts Bldg. 8222 – High-Intensity Discharge (HID) fixtures
HVAC:	Bldg. 8218 – Split-DX units Bldgs. 8218, 8222 – Air-cooled chiller system with gas boiler heat
Controls:	EMS, Manufacturer: Johnson Controls

Group 4: HS, MS, HS Gym, Cafe

Buildings:	8234, 8236, 8238, 8240, 8242, 8244, 8246, 8248
Stories:	Single story buildings
Area:	122,056 SF
Bldg. Components:	Brick building, pitched metal roof and flat built-up roof, slab on grade
Typical Lighting Fixtures:	Bldgs. 8234, 8236, 8238, 8240, 8244, 8246, 8248 – T12 fluorescent fixtures with magnetic ballasts Bldg. 8242 – T8 fluorescent fixtures with electronic ballasts and HID fixtures in gymnasium
HVAC:	Bldg. 8234 – Packaged rooftop units & Air-cooled chiller system with gas boiler Bldgs. – 8236, 8238, 8240 – Air-cooled chiller system with gas boiler Bldg. 8242 – Packaged rooftop units and split-DX systems Bldgs. 8244, 8246, 8248 – Split-DX systems with gas boiler
Controls:	EMS, Manufacturer: Johnson Controls

Group 5: Maint. Bldg.

Building:	8254
Stories:	Single story building
Area:	8,564 SF
Bldg. Components:	Brick building, pitched metal roof, slab on grade
Typical Lighting Fixtures:	T12 fluorescent fixtures with magnetic ballasts
HVAC:	Spilt-DX systems
Controls:	Standard Thermostats

Group 6: Admin. Bldg.

Building:	8265
Stories:	Single story building
Area:	5,920 SF
Bldg. Components:	Brick building, pitched metal roof, slab on grade
Typical Lighting Fixtures:	T12 fluorescent fixtures with magnetic ballasts
HVAC:	Split-DX systems
Controls:	EMS, Manufacturer: Johnson Controls

Group 7: New Elem Wing

Buildings:	8350, 8352, 8354
Stories:	Single story building
Area:	65,000 SF
Bldg. Components:	Brick building, pitched metal and flat modified bitumen roof, slab on grade
Typical Lighting Fixtures:	T8 fluorescent fixtures with electronic ballasts
HVAC:	Air-cooled chiller system with gas boiler
Controls:	EMS, Manufacturer: Johnson Controls

3.0 ENERGY CONSUMPTION AND PERFORMANCE

A site survey was conducted at several of the District's facilities. The facilities surveyed comprised a total gross area of approximately 280,000 square feet.

Annual electric and natural gas invoices for the buildings surveyed were $338,917 for the 12 month period ending September 2008. A summary of annual utility costs is provided in **Appendix C**, Base Year Consumption History.

To help the District evaluate the overall energy performance of its facilities TEESI has calculated their Energy Utilization Index (EUI) and Energy Cost Index (ECI). The EUI represents a facility's annual energy usage per square foot, it is measured as BTU's per square foot per year (BTU/SF/Year). Similarly, ECI is measured as cost per square foot per year ($/SF/Year). The EUI and ECI performance for selected facilities are listed below:

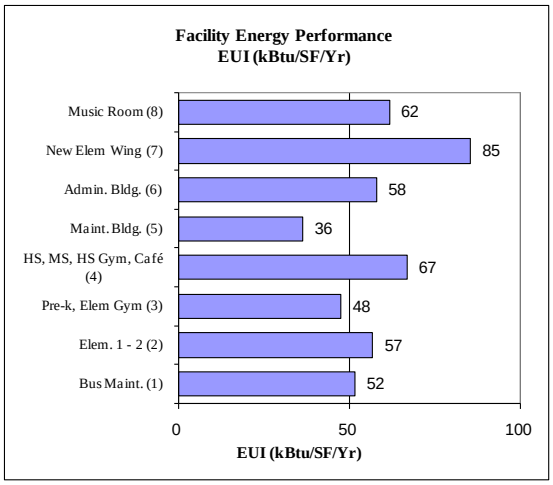
Energy Cost and Cosumption Benchmarks

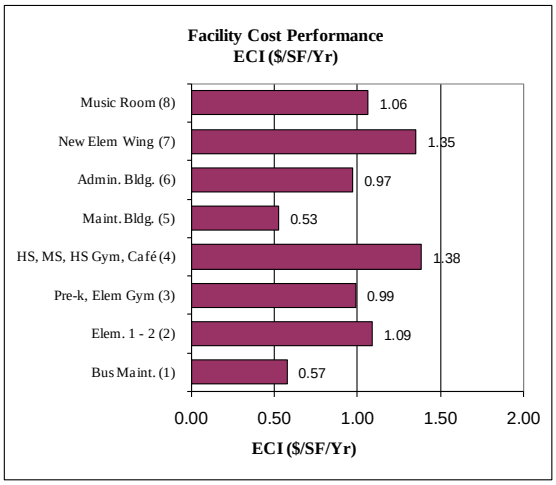
		Electric		Natural Gas		Total	Total	EUI	ECI	
Group	Building	KWH/Yr	$Cost/Yr	MCF/Yr	$Cost/Yr	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
1	Bus Maint. (1)	16,962	1,217	187	1,577	2,794	251	52	0.57	4,860
2	Elem. 1 - 2 (2)	532,280	40,029	460	3,861	43,889	2,291	57	1.09	40,309
3	Pre-k, Elem Gym (3)	611,400	43,460	12	96	43,556	2,099	48	0.99	44,145
4	HS, MS, HS Gym, Café (4)	2,338,880	167,495	172	1,445	168,940	8,159	67	1.38	122,056
5	Maint. Bldg. (5)	44,600	3,224	155	1,274	4,498	312	36	0.53	8,564
6	Admin. Bldg. (6)	67,296	4,838	110	906	5,744	343	58	0.97	5,920
7	New Elem Wing (7)	740,720	53,289	1,694	14,360	67,649	4,273	85	1.35	50,000
8	Music Room (8)	22,100	1,592	31	253	1,846	107	62	1.06	1,736
		KWH/Yr	$Cost/Yr	MCF/Yr	$Cost/Yr	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
		4,374,238	315,144	2,822	23,772	338,917	17,836	64	1.22	277,590

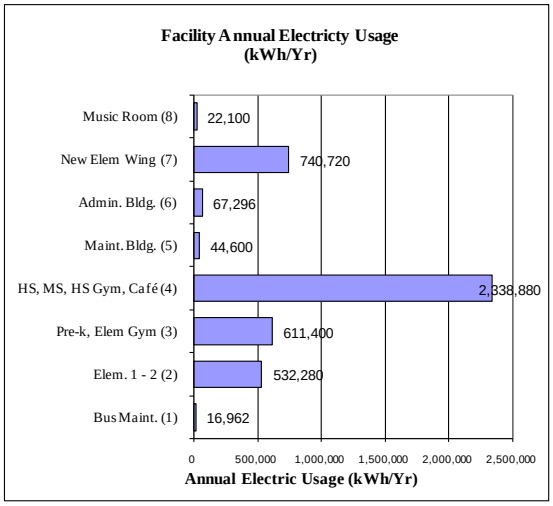
(1) Included Bldg. - 5290
(2) Includes Bldgs. - 8220, 8224, 8226, 8228, 8230, 8232
(3) Includes Bldgs. - 8222, 8218E, 8218
(4) Includes Bldgs. - 8240, 8238, 8234, 8236, 8242, 8244, 8246, 8248
(5) Includes Bldg. - 8254
(6) Includes Bldg. - 8265
(7) Includes Bldgs. - 8350, 8352, 8354
(8) Includes Bldg. - 8225

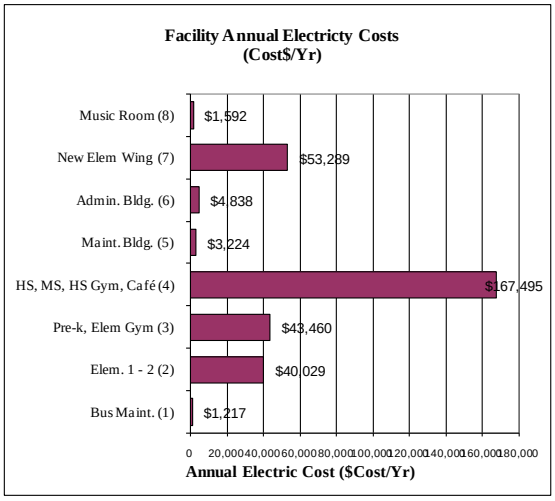
Knowing the EUI and ECI of each facility is useful to help determine the District's overall energy performance. In addition, the District's EUI was compared to TEESI's database of Texas schools. See **Appendix D** to determine how each facility ranked.

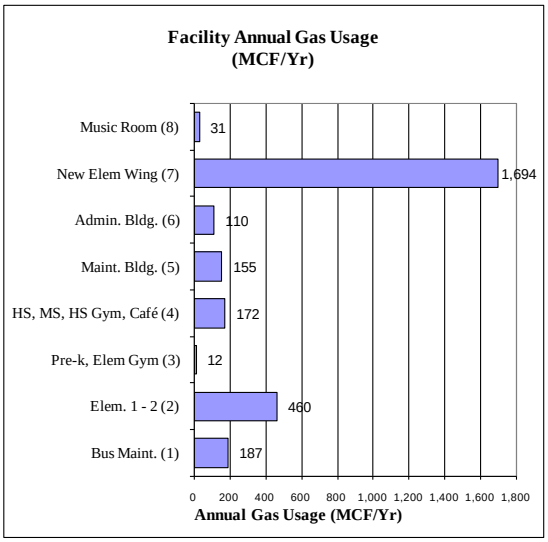
The following charts summarize the data presented in the previous table. See **Appendix C** for further detail.

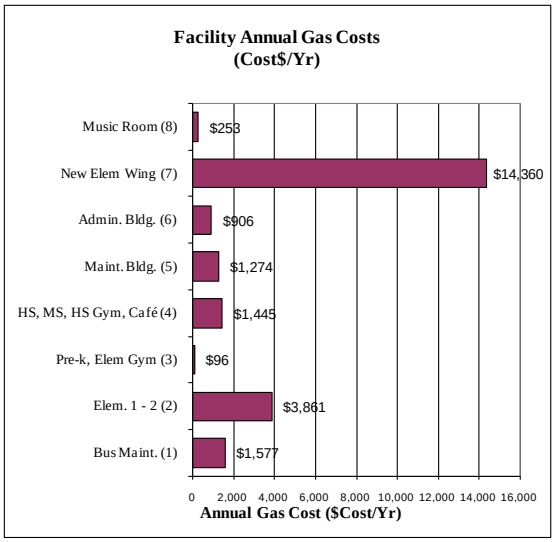












(1) Included Bldg. - 5290
(2) Includes Bldgs. - 8220, 8224, 8226, 8228, 8230, 8232
(3) Includes Bldgs. - 8222, 8218E, 8218
(4) Includes Bldgs. - 8240, 8238, 8234, 8236, 8242, 8244, 8246, 8248
(5) Includes Bldg. - 8254
(6) Includes Bldg. - 8265
(7) Includes Bldgs. - 8350, 8352, 835
(8) Includes Bldg. - 8225

4.0 ENERGY ACCOUNTING

UTILITY PROVIDERS

Lackland Air Force Base (LAFB) provides electric service and natural gas service to the District.

MONITORING AND TRACKING

An effective energy tracking system is an essential tool by which an energy management program's activities are monitored. The system should be centralized and available for all engaged staff members to use in verifying progress toward established targets, milestones, and deadlines.

Presently, the District receives periodic billing data from LAFB. It was noted that several of the District's utility usage is being estimated. The District should encourage LAFB to install or repair existing utility meters to able to track actual utility usage.

The District should consider consolidating the tracking and recording of all the Districts utility accounts (i.e., Electricity, Natural Gas, Water, etc.) into an electronic spreadsheet similar to the chart shown in following page. Along with total utility costs ($), utility consumption should be recorded as well (i.e., kWh, MCF, gallons, etc.). The District can use this data to track utility consumption patterns and budget utility expenses. Having this historical data improves the District's awareness of their energy performance and will help in tracking their energy reduction goals.

The steps below are essential for an effective energy management tracking system:

1. Perform regular updates. An effective system requires current and comprehensive data. Monthly updates should be strongly encouraged.

2. Conduct periodic reviews. Such reviews should focus on progress made, problems encountered, and potential rewards.

3. Identify necessary corrective actions. This step is essential for identifying if a specific activity is not meeting its expected performance and is in need of review.

In addition, having this historical utility data would facilitate **House Bill 3693** and **Senate Bill 12** reporting requirements. Please see Section 5.0 for additional information regarding these requirements.

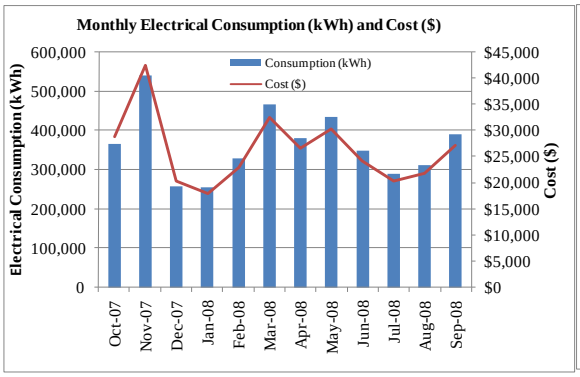
Furthermore, below is a sample format the District can customize to help summarize their overall utility usage and costs.

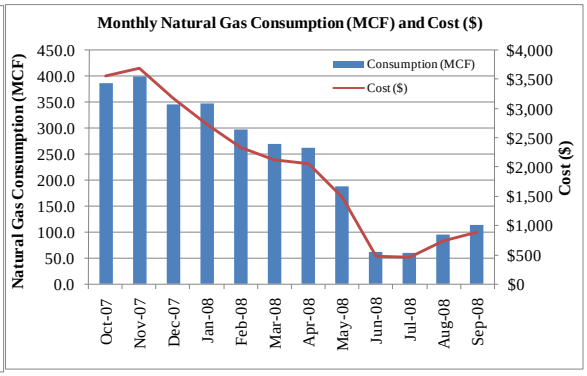
The data presented below is a summation of the data provided by the District. This data below includes only selected utility accounts and is for reference purposes only and does not represent the District's total utility data. See **Appendix C** for further detail regarding each utility account represented in the table below.

Lackland ISD - Sample Utility Data Input Form

MONTH	ELECTRICITY			NATURAL GAS			WATER		
	KWH	COST $	$/KWH	MCF	COST $	$/MCF	GAL	COST $	$/GAL
Oct-07	366,047	$28,841	$0.0788	385.9	$3,562	$9.2			
Nov-07	539,842	$42,534	$0.0788	400.6	$3,699	$9.2			
Dec-07	257,578	$20,295	$0.0788	345.1	$3,187	$9.2			
Jan-08	256,723	$17,868	$0.0696	346.9	$2,735	$7.9			
Feb-08	329,762	$22,952	$0.0696	296.6	$2,339	$7.9			
Mar-08	466,666	$32,481	$0.0696	269.4	$2,124	$7.9			
Apr-08	381,957	$26,585	$0.0696	261.7	$2,063	$7.9			
May-08	434,744	$30,259	$0.0696	188.1	$1,483	$7.9			
Jun-08	348,168	$24,233	$0.0696	60.6	$478	$7.9			
Jul-08	290,264	$20,203	$0.0696	58.9	$464	$7.9			
Aug-08	311,658	$21,692	$0.0696	94.2	$743	$7.9			
Sep-08	390,829	$27,202	$0.0696	113.6	$896	$7.9			
Total	4,374,238	$315,144	$0.0720	2,822	$23,772	$8.4			

Gross Building Area:	277,590	SF





5.0 SENATE BILL 12 AND HOUSE BILL 3693 OVERVIEW

In 2001, the 77th Texas Legislature passed Senate Bill 5 (SB5), also known as the Texas Emissions Reduction Plan, to amend the Texas Health and Safety Code. The legislation required ambitious, fundamental changes in energy use to help the state comply with federal Clean Air Act standards. It applied to all political subdivisions within 38 designated counties, later expanded to 41 counties.

In 2007, the 80th Texas Legislature passed Senate Bill 12 (SB 12) which among other things extended the timeline set in SB 5 for emission reductions. In the same period, the 80th Texas Legislature passed House Bill 3693 (HB 3693) which amended provisions of several codes relating primarily to energy efficiency.

The Bill requirements that are most relevant to this program are as follows:

Establish a goal of reducing electric consumption by five percent (5%) each state fiscal year for six (6) years, beginning on September 1, 2007.

Record electric, water, and natural gas utility services (consumption and cost) in an electronic repository. The recorded information shall be on a publicly accessible Internet Web site with an interface designed for ease of navigation if available, or at another publicly accessible location.

Energy-efficient light bulbs for buildings, requires an institution to purchase commercially available light bulbs using the lowest wattages for the required illumination levels.

Installation of energy saving devices in Vending Machines with non-perishable food products. **Not required by School Districts but highly recommended.**

A summary description of SB 12 and HB 3693 is available in **Appendix A.** Further detail regarding each bill can be found in the Texas Legislature website (://www.capitol.state.tx.us/Home.aspx).

To help with the utility reporting process a sample input form can be found in **Appendix B** of this report.

6.0 RECOMMENDED MAINTENANCE & OPERATION PROCEDURES

Sound Maintenance and Operation procedures significantly improve annual utility costs, equipment life, and occupant comfort. Generally, maintenance and operation procedural improvements can be made with existing staff and budgetary levels. With this in mind, the following maintenance and operation procedures are recommended.

PUBLICIZE ENERGY CONSERVATION

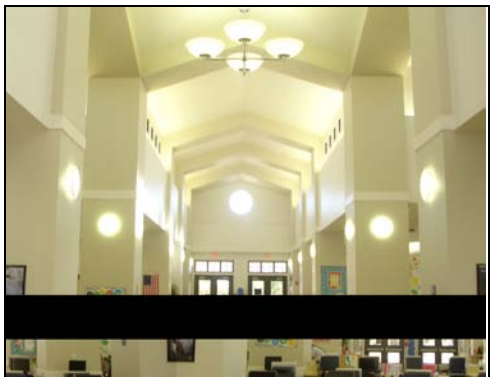
Promote energy awareness at regular staff meetings, on bulletin boards, and through organizational publications. Publicize energy cost reports showing uptrends and downtrends.

WATT WATCHER PROGRAM

Watt Watchers of Texas is a FREE energy conservation program for Texas schools sponsored by the Texas State Energy Conservation Office/ Comptroller of Public Accounts and the Department of Energy. The program is designed for K-12 classrooms the help energy conservation awareness. The program encourages student and staff participation to help schools reduce energy waste. Information regarding this program in is found in **Appendix F**.

IMPROVE CONTROL OF INTERIOR & EXTERIOR LIGHTING

Establish procedures to monitor use of lighting at times and places of possible/probable unnecessary use: Offices and classes at lunchtime, maintenance shops, closets, parking lots during daylight hours, etc. One or two friendly reminders for minor infractions will usually result in lower electric bills. The picture below is a good example of Daylighting opportunities. When sufficient natural light is present, some architectural lighting (i.e. cove lighting, wall scones, etc.) may be switched off. This process can be accomplished manually by staff member or automatically with the installation of photosensor control. Please note this procedure should ensure minimum lighting levels are maintained during occupied hours.



Daylighting Opportunities
New Library – Bldg. 8350

ESTABLISH HVAC UNIT SERVICE SCHEDULES

Document schedules and review requirements for replacing filters, cleaning condensers, and cleaning evaporators. Include particulars such as filter sizes, crew scheduling, contract availability if needed, etc. Replace filters with standard efficiency pleated units. Generally, appropriate service frequencies are as follows -- filters: monthly; condensers: annually; evaporators: 5 years.

TYPICAL EQUIPMENT MAINTENANCE CHECKLISTS

Effective operation and maintenance of equipment is one of the most cost effective ways to achieve reliability, safety, and efficiency. Failing to maintain equipment can cause significant energy waste and severely decrease the life of equipment. Substantial savings can result from good operation and maintenance procedures. In addition, such procedures require little time and cost to implement. Examples of typical maintenance checklists for common equipment including, boilers, chillers, building controls, pumps, fans, and electric motors, are provided in **Appendix E**. These checklists from the Federal Energy Management Program (FEMP), a branch of the Department of Energy (DOE), are based on industry standards and should supplement, not replace those provided by the manufacturer.

PRE-IDENTIFY PREMIUM EFFICIENCY MOTOR (PEM) REPLACEMENTS

Pre-identify supply sources and PEM stock numbers for all HVAC fan and pump motors so that as failures occur, replacement with PEM units can take place on a routine basis. As funding allows, pre-stock PEM replacements according to anticipated demand, i.e., motors in service more than 10 years, motors in stressful service, and particular motor types that are in service at several locations.

CONTROL OUTSIDE AIR INFILTRATION

Conduct periodic inspections of door and window weather-stripping, and schedule repairs when needed. Additionally, make sure doors and windows are closed during operation of HVAC systems (heating or cooling). Unintended outside air contributes to higher energy consumption and increases occupant discomfort.

REPLACE INCANDESCENT LAMPS WITH COMPACT FLUORESCENTS

Replace existing incandescent lamps with compact fluorescent lamps as they burn out. Compact fluorescents use 50 to 75 percent less wattage for the same light output, with ten times the operating life of incandescents.

ENERGY STAR POWER MANAGEMENT

ENERGY STAR Power Management Program promotes placing monitors and computers (CPU, hard drive, etc.) into a low-power “sleep mode” after a period of inactivity. The estimated annual savings can range from $25 to $75 per computer. ENERGY STAR recommends setting computers to enter system standby or hibernate after 30 to 60 minutes of inactivity. Simply

touching the mouse or keyboard "wakes" the computer and monitor in seconds. Activating sleep features saves energy, money, and helps protect the environment.

INSTALL ENERGY SAVING DEVICES ON VENDING MACHINE

Install energy saving devices on vending machines with non-perishable food items to reduce the equipment power usage. These devices shut the vending machines down during unoccupied periods. There are several commercially available devices that can be easily installed on existing vending machines. These devices typical have a motion sensor which powers down the equipment after periods of inactivity. For example if the motion sensor does not sense activity within 15 minutes the device will shutdown the vending machine and turn on once motion is sensed. These devices range in price from $100 to $250 and have a typical annual savings of $20 to $150 per vending machine.

HAIL GUARDS ON CONDENSING AND PACKAGED ROOFTOP UNITS

When an HVAC unit is replaced the District should ensure the new unit be specified with hail guards. The hail guards protect the condensing unit's heat exchanger coils from hail damage. Damage to the condensing unit heat exchangers reduces the efficiency of the units. During the preliminary walk-through it was noted that several of the units did not have hail guards installed and showed signs of significant hail damage. It is recommended unit(s) with hail damage on condensing fins be straightened using a fin comb. The picture below is an example of damage condensing coil fins.

Package Rooftop Units above
High School Gym – Bldg. 8242

7.0 RETROFIT OPPORTUNITIES

Energy retrofit projects identified during the preliminary analysis are detailed below. Project cost estimates include complete design and construction management services.

RETROFIT INTERIOR LIGHTING

Replace T-12 fluorescent lamps and magnetic ballasts with high efficiency T-8 fluorescent lamps and electronic ballasts throughout the District's facilities listed below. Typical four-foot, two-lamp magnetic ballast fixtures require 80 watts, while electronic ballasts and T-8 lamps in the same fixture configuration require only 50 watts. The table below indicates the facilities where T-12 fluorescent lamps were observed during the preliminary walkthrough. The cost and savings noted below are based on preliminary observations of the facilities. Exact cost and quantities can be identified through a detailed energy audit.

LIGHTING RETROFIT			
Building	**Estimated Implementation Cost**	**Estimated Annual Savings**	**Payback (years)**
Elementary Bldg. 8220*	$1,500	$300	5.0
Pre-K Bldg. 8218	$10,600	$1,900	5.6
HS, MS, HS Gym, Café (4)	$63,400	$14,000	4.5
Admin. Bldg. (6)	$3,800	$700	5.4
TOTAL	**$79,300**	**$16,900**	**4.7**

*** T12s found in certain areas in some offices and hallways. T8s found in classrooms.**

Exact costs and quantities can be identified during detailed assessment.

REPLACE HVAC SYSTEMS

Replace two (2) packaged Rooftop Units (RTUs) serving the High School Gym's - Employee Workout area (Bldg. 8242) with new high. The existing systems are inefficient, beyond their economical life and require extensive maintenance. The table below summarizes the estimated cost and savings for replacing these units.

HVAC REPLACEMENT			
Building	**Estimated Implementation Cost**	**Estimated Annual Savings**	**Payback (years)**
HS Gym Bldg. 8242	$26,000	$1,730	15.0
TOTAL	**$26,000**	**$1,730**	**15.0**

BUILDING COMMISSIONING (Cx)

Detailed HVAC commissioning in an existing building involves analysis of existing systems to ensure compliance with original set-up/design conditions and where feasible to adjust operating parameters to enhance comfort and reduce energy consumption. Based on the preliminary examination (utility data review, discussion with staff, and walkthrough) of the District's facilities indicated potential for energy cost savings primarily in the HVAC and lighting systems operations. The facilities noted in the following table would greatly benefit by implementing a comprehensive Building Commissioning (Cx) program.

These facilities have a heavy population of system devices, sensors, mechanical equipment, etc. With the implementation of the retrofit projects noted in the previous section the Building Commissioning (Cx) process will ensure all system operate as intended.

Commissioning measures are typically characterized as fast payback, usually 36-60 months. Examples include chiller, boiler, air handler and terminal box service and/or adjustment, calibration of control systems and temperature settings, balancing conditioned air and/or chilled water flows etc. There are various degrees and types of commissioning programs. The cost and savings estimates presented here are for a detailed commissioning program. The project implementation duration may vary from a 10 to 12 months period.

The goal of commissioning is to deliver a facility that operates as it was intended, meets the needs of the building owner and occupants, and provides training of facility operators. To reach this goal it is necessary for the commissioning process to provide documentation and verification of the performance of all building equipment and systems. For the process to work successfully it is equally important to have good communications between all participants (building designers, owners, operators and the commissioning agent) and to keep all parties involved and informed of all pertinent decisions.

At the building level, typical commissioning measures will look into opportunities to optimize the operations of HVAC equipment. Detailed commissioning measures at the building level may include the following:

1. Optimize the AHU operation
    - Develop optimal schedule for the AHUs.
    - Develop optimal reset schedules for single duct VAV unit discharge air temperature setpoints.
    - Develop optimal cold deck and hot deck temperature reset schedules.
    - Develop optimal duct static pressure reset schedules for VAV units.
    - Improve economizer cycle operation (if applicable).
    - Determine damper positions for minimum outside air intake.
    - Optimize air distribution where necessary.

2. Verify and calibrate the temperature and pressure sensors
    - Verify the accuracy of space temperature sensors, discharge air, cold deck and hot deck temperature sensors, as well as duct static pressure sensor and water differential pressure sensors. Calibrate the sensors if necessary.

3. Set up trends for major control parameters
    - Trending for major control parameters such as cold and hot deck temperatures, discharge air temperatures and static pressures.

4. Identify malfunctioning devices
    - Identify malfunctioning devices such as leaky valves. Reconnect damper linkages that are disconnected.

5. Reprogram control sequences where required

6. Optimize Central Plant Performance
    - Develop optimal start/stop schedules for chillers and boilers.
    - Develop optimal reset schedule for water supply temperature for chillers and boilers.

The following Commissioning estimates are based on a preliminary walkthrough and available utility data analysis. Please note, not included in the estimate below are the anticipated costs for items such as software & hardware upgrades and deferred maintenance items.

BUILDING COMMISSIONING (Cx)			
Building	**Estimated Implementation Cost**	**Estimated Annual Savings**	**Payback (years)**
Elem. 1 - 2 (2)	$22,000	$4,400	5.0
HS, MS, HS Gym, Café (4)	$68,000	$15,100	4.5
New Elem Wing (7)	$36,000	$7,200	5.0
TOTAL	**$126,000**	**$26,700**	**4.7**

(2) Includes Bldgs. - 8220, 8224, 8226, 8228, 8230, 8232

(4) Includes Bldgs. - 8240, 8238, 8234, 8236, 8242, 8244, 8246, 8248

(5) Includes Bldg. - 8254

The following table summarizes the implementation costs, annual savings and payback for the above projects:

SUMMARY OF ENERGY COST REDUCTION MEASURES			
Project Description	**Estimated Implementation Cost**	**Estimated Annual Savings**	**Payback (years)**
Retrofit Lighting Systems	$79,300	$16,900	4.7
Replace HVAC	$26,000	$1,730	15.0
Building Commissioning (Cx)	$126,000	$26,700	4.7
TOTAL:	**$231,300**	**$45,330**	**5.1**

The above projects implementation costs and annual savings are estimated based on a preliminary examination of the facilities. Final costs will be determined from detailed building assessments, engineering calculations, and contractor estimates.

Project design (drawings and specifications), if authorized, would normally be accomplished by professional engineers. Project acquisition (competitive bidding) would be in accordance with District requirements, and construction management would be provided by the engineering group who prepared the drawings and specifications.

8.0 CAPITAL IMPROVEMENT PROJECTS

This section is intended to describe capital improvement projects that do have energy savings opportunities but cannot be justified solely based on the potential energy savings. However, these projects may be considered essential to ensure optimum system performance, enhance occupant comfort and to improve overall building efficiency. Capital Improvement Projects identified during the preliminary analysis are detailed below. Project cost estimates include complete design and construction management services.

REPLACE HVAC SYSTEMS

Replace the existing Air-Cooled Chiller serving the Elementary Classrooms (Bldgs 8224, 8228, 8232) with a new high efficiency unit. The existing Air-Cooled Chiller is approximately 125 tons in capacity. The existing chiller is approximately nineteen (19) years old and has reached its useful life. Replacing this chiller with a new high efficiency unit will help improve the system's efficiency, reliability and enhance occupant comfort.

The table below summarizes the estimated cost for replacing the unit at the building listed below.

AIR COOLED CHILLER REPLACEMENT			
Building	**Estimated Implementation Cost**	**Estimated Annual Savings**	**Payback (years)**
Elementary Bldgs. 8224, 8228, 8232*	$213,200	$11,800	18.1
TOTAL	**$213,200**	**$11,800**	**18.1**

* Includes piping and pump modification costs.

9.0 FUNDING OPTIONS FOR CAPITAL ENERGY PROJECTS

Institutional organizations have traditionally tapped bond money, maintenance dollars, or federal grants to fund energy-efficient equipment change outs or additions such as energy-efficient lighting systems, high efficiency air conditioning units, and computerized energy management control systems. Today, a broader range of funding options are available. A number of these are listed below.

Texas LoanSTAR Program

The LoanSTAR (Saving Taxes and Resources) Program, which is administered by the State Energy Conservation Office, finances energy-efficient building retrofits at a current interest rate of 3 percent. The program's revolving loan mechanism allows borrowers to repay loans through the stream of cost savings realized from the projects. Projects financed by LoanSTAR must have an average simple payback of ten years or less and must be analyzed in an Energy Assessment Report by a Professional Engineer. Upon final loan execution, the School District proceeds to implement funded projects through the traditional bid/specification process. Contact: Theresa Sifuentes (512/463-1896).

Internal Financing

Improvements can be paid for by direct allocations of revenues from an organization's currently available operating or capital funds (bond programs). The use of internal financing normally requires the inclusion and approval of energy-efficiency projects within an organization's annual operating and capital budget-setting process. Often, small projects with high rate of return can be scheduled for implementation during the budget year for which they are approved. Large projects can be scheduled for implementation over the full time period during which the capital budgets is in place. Budget constraints, competition among alternative investments, and the need for higher rates of return can significantly limit the number of internally financed energy-efficiency improvements.

Private Lending Institutions or Leasing Corporations

Banks, leasing corporations, and other private lenders have become increasingly interested in the energy efficiency market. The financing vehicle frequently used by these entities is a municipal lease. Structured like a simple loan, a municipal leasing agreement is usually a lease-purchase arrangement. Ownership of the financed equipment passes to the School District at the beginning of the lease, and the lessor retains a security interest in the purchase until the loan is paid off. A typical lease covers the total cost of the equipment and may include installation costs. At the end of the contract period the lessee pays a nominal amount, usually a dollar, for title to the equipment.

Performance Contracting with an Energy Service Company

Through this arrangement, an energy service company (ESCO) uses third party financing to implement a comprehensive package of energy management retrofits for a facility. This turnkey service includes an initial assessment by the contractor to determine the energy-saving potential for a facility, design work for identified projects, purchase and installation of equipment, and overall project management. The ESCO guarantees that the cost savings generated by the projects will, at a minimum, cover the annual payment due to the ESCO over the term of the contract.

Utility Sponsored Energy Efficiency Incentive Programs

Many of the State's utilities offer energy efficiency incentive programs to offset a portion of the upfront cost associated with energy efficiency measures. The program requirements and incentives range from utility to utility. For example, CenterPoint Energy provides incentives for efficiency measures such as installation of high efficiency equipment, lighting upgrades, and building commissioning. These energy efficiency programs' incentives typically cover $0.06/kWh and $175/kW of verifiable energy and demand reductions, respectively. For further information, contact your utility provider to determine what programs are available in your area.

10.0 ENERGY MANAGEMENT POLICY/PLAN

ENERGY MANAGEMENT POLICY

In order to establish an effective Energy Management Program it should have support from top management. An Energy Management Policy adopted by the school board sends a strong signal that energy management is an institutional priority. A formal Energy Management Policy can be as simple as a two-page document that clearly states the District's energy management objectives. The policy should cover items such as:

- who is accountable for energy management
- what your energy savings targets are
- how you will monitor, review and report on progress
- staffing and training to support the policy
- criteria for energy management investment
- working energy efficiency into new capital investments

ENERGY MANAGEMENT PLAN

By requesting this study the District has demonstrated a desire to take a more aggressive approach to energy management. The first step is to obtain commitment from the District Board by the adoption of an Energy Management Policy. The next step is to establish an Energy Management Plan. The purpose of the Energy Management Plan is to define roles, responsibilities, procedures and establish authority. At a minimum, the District should include the following steps in the District's Energy Management Plan:

1. ESTABLISH ROUTINE ENERGY TRACKING AND REPORTING PROCEDURES Establishing a procedures to monitor energy usage and cost will help identify energy use patterns. The data will also help determine the effectiveness of the Energy Management Program.

2. ESTABLISH AN ENERGY MANAGEMENT STEERING COMMITTEE The Energy Management Steering Committee will include representatives from a cross section of the District. The steering committee will serve as a review board to evaluate all energy management recommendations before adoption and implementation. The steering committee will meet **quarterly or semiannually** to review the District's energy cost and consumption. Regular meetings will ensure the Districts goals are being met prior to the end of the year.

3. PROMOTE ENERGY AWARENESS The energy management steering committee members shall establish a program to publicize the District's energy goals and progress on a **quarterly or semiannually** basis. For example, student drawn posters of the District's energy savings can be placed in hallways. This will encourage student involvement and act as an educational tool. Continuous promotion of the District's goals will ensure the sustainability of the energy management program and help achieve further energy savings. **In addition, considering participating in the SECO sponsored WattWatchers program will help accomplish this task, see Appendix E for further information regarding this program.**

4. ESTABLISH ACCEPTABLE EQUIPMENT PARAMETERS Establish a District-wide uniform temperature set point for all HVAC units. Having a standard setpoint will help keep HVAC runtimes to a minimum. The following are some suggested temperature settings, however, the district will need to monitor and ensure that other building parameters (humidity levels etc.) are within acceptable limits. Also, areas with special equipment (MDF/IDF, server rooms, etc.) shall be maintained at equipment supplier recommended settings.

Occupied Cooling Temperature Setpoints:

Instructional Areas	74 F – 76 F
Admin Areas	72 F – 74 F

Unoccupied Cooling Temperature Setpoints:

Instructional Areas	85 F
Admin Areas	85 F

Occupied Heating Temperature Setpoints:

Instructional Areas	68 F
Admin Areas	68 F

Unoccupied Heating Temperature Setpoints:

Instructional Areas	55 F
Admin Areas	55 F

5. STAFF INCENTIVES AND RECOGNITION PROGRAM Establishing a student, staff and campus incentive and recognition program would help promote and encourage support from staff and custodial members. The District may consider implementing a staff incentive and recognition program. Following are some program examples.

- The energy accounting system can be used to monitor cost savings and compare it to the base year consumption. An energy incentive plan consisting of a 50-50 sharing with the school campus and the Energy Management Program could be employed. The school would get 50% of the savings resulting from energy cost reduction. The school would be free to use the money for educational programs such as materials, supplies, etc. The other 50% would be used for continuing energy management efforts. The following is an example of the Building savings summary report.

  EXAMPLE:

  High School - Annual Total Electric Cost

Baseline (2006 - 07)	Current (2007 - 08)	Savings	50% Savings
$248,483	$240,483	$8,000	$4,000

In this example, the High School saved $8,000 where 50% ($4,000) will be assigned to the school. This money will be paid on October of the following fiscal year.

- ❖ An energy flag program will be implemented. There will be three energy flags, one flag per each grade level. This energy flags will be awarded to the schools exhibiting the greatest percentage reduction in energy costs. Energy flags will be awarded on a rotating basis each summer. In order to provide motivation, maintain enthusiasm, and recognize individuals doing their part to save the District taxpayers money through the Energy Management Program, the local media (including district newsletters) will be informed of the Energy flag results. The energy flag will be awarded on January and August of each year based on the energy consumption of the previous four months.

- ❖ The successes of the program should also be communicated to the public through the media to show what the District is doing to reduce costs to taxpayers.

6. ESTABLISH AN OPERATIONS AND MAINTENANCE EFFICIENCY PROGRAM The purpose of this program is to establish operating procedures, perform preventive maintenance, and schedule equipment system checks to prevent premature equipment failures and increase efficiency, reliability, and safety. There are several resources the District can use to help develop this program. The following is good resource which will help establishing an effective O&M Program, Federal Energy Management Program (FEMP), Operation & Maintenance Best Practices "A guide to Achieving Operational Efficiency, Release 2.0, July 2004, ://www1.eere.energy.gov/femp/information/publications.html. Furthermore, a comprehensive Building Commissioning can aid in developing this program.

7. ESTABLISH A WATER MANAGEMENT PROGRAM Along with saving energy the District shall a establish a program to reduce water consumption. The following conservation measures shall be employed.

- ❖ Investigate the use of water conserving faucets, showerheads, and toilets in all new and existing facilities.
- ❖ Utilize water-previous materials such as gravel, crushed stone, open paving blocks or previous paving blocks for walkways and patios to minimize runoff and increase infiltration.
- ❖ Employ Xeriscaping, using native plants that are well suited to the local climate, that are drought-tolerant and do not require supplemental irrigation.
- ❖ Utilize drip irrigation systems for watering plants in beds and gardens.
- ❖ Install controls to prevent irrigation when the soil is wet from rainfall.
- ❖ Establish a routine check of water consuming equipment for leaks and repair equipment immediately.

8. REQUIRE NEW & EXISTING BUILDINGS TO MEET LEED® STANDARDS The Leadership in Energy and Environmental Design (LEED®) Green Building Rating System™ encourages the adoption of sustainable green building and development practices through the creation and implementation of universally understood and accepted tools and performance criteria. The District may implement LEED® for New Construction, LEED® for Existing Buildings, or LEED® for Schools. Striving to meet LEED® Standards will help improve energy efficiency, the environment, student health, and indoor air quality. At minimum the District should strive to meet the following LEED® Credits found in the LEED® for Existing Building Guidelines (**See Appendix I**)

LEED® for Existing Buildings

SUSTAINABLE SITES (SS)

- Credit 4 (pts. 4): Alternative Commuting Transportation

WATER EFFICIENCY (WE)

- Prerequisite 1 (required) : Minimum Indoor Plumbing Fixture and Fitting Efficiency
- Credit 3 (pts. 3): Water Efficient Landscaping

ENERGY & ATMOSPHERE (EA)

- Prerequisite 1 (required): Energy Efficiency Best management Practice: Planning, Documentation and Opportunity Assessment
- Prerequisite 2 (required): Minimum Energy Efficiency Performance
- Prerequisite 3 (required): Refrigerant Management: Ozone Protection
- Credit 1 (pts. 2-15): Optimize energy Efficiency Performance
- Credit 2.1 – 2.3 (pts. 6): Existing Building Commissioning
- Credit 3.1 (pts. 1): Performance Measurement: Building Automation System
- Credit 4 (pts. 4): On-Site and Off-Site Renewable Energy

MATERIAL & RESOURCES (MR)

- Prerequisite 1 (required): Sustainable Purchasing Policy
- Prerequisite 2 (required): Solid Waste Management Policy
- Credit 1.1 – 1.3 (pts. 3): Sustainable Purchasing: Ongoing Consumables
- Credit 2.1 & 2.2 (pts. 2): Sustainable Purchasing: Durable Goods
- Credit 5 (pts. 1): Sustainable Purchasing: Food

INDOOR ENVIRONMENTAL QUALITY (EQ)

- Prerequisite 1 (required): Outdoor Air Introduction & Exhaust Systems
- Prerequisite 2 (required): Environmental Tobacco Smoke (ETS) Control
- Prerequisite 3 (required): Green Cleaning Policy
- Credit 1.1 (pts. 1): Indoor Air Quality Best Management Practices
- Credit 2.1 (pts. 1): Occupant Comfort: Occupant Survey
- Credit 2.3 (pts. 1) Occupant Comfort: Thermal Comfort Monitoring
- Credit 3.1 – 3.9 (pts. 1 - 9): Green Cleaning

INNOVATION IN OPERATIONS

- Credit 2 (pts. 1): LEED® Accredited Professional
- Credit 3 (pts. 2): Documenting Sustainable Building Costs Impacts
- Credit 3 (pts. 1): The School as a Teaching Tool

Achieving the LEED® Credits listed above will help the District attain the minimum number of points required to be LEED® Certified.

11.0 ANALYST IDENTIFICATION

Texas Energy Engineering Services, Inc.
Capital View Center, Suite B-325
1301 Capital of Texas Highway
Austin, Texas 78746
(512) 328-2533
TBPE Firm Registration #F-003502

M. Saleem Khan, P.E., CxA
David Rocha, LEED®-AP

APPENDICES

APPENDIX A

SENATE BILL 12 AND HOUSE BILL 3693

How to comply with SB12 & HB 3693

What you need to know about Texas Senate Bill 12

The passage of Senate Bill 12 (SB12) by the 80th Texas Legislature signified the continuance of Senate Bill 5 (SB5), the 77th Texas Legislature's sweeping approach in 2001 to clean air and encourage energy efficiency in Texas. SB12 was enacted on September 1, 2007 and was crafted to continue to assist the state and its political jurisdictions to conform to the standards set forth in the Federal Clean Air Act. The bill contains energy-efficiency strategies intended to decrease energy consumption while improving air quality.

All political subdivisions in the 41 non-attainment or near non-attainment counties in Texas are required to:

*1) Adopt a goal to reduce electric consumption by 5 percent each year for six years, beginning September 1, 2007**

2) Implement all cost-effective energy-efficiency measures to reduce electric consumption by existing facilities. (Cost effectiveness is interpreted by this legislation to provide a 20 year return on investment.)

3) Report annually to the State Energy Conservation Office (SECO) on the entity's progress, efforts and consumption data.

*Note: The recommended baseline data for those reporting entities will consist of the jurisdiction's 2006 energy consumption for its facilities and based on the State Fiscal Year (September 1, 2006 to August 31, 2007).

What you need to know about Texas House Bill 3693

The passage of House Bill 3693 (HB3693) by the 80th Texas Legislature is intended to provide additional provisions for energy-efficiency in Texas. Adopted with an effective date of September 1, 2007, HB 3693 is an additional mechanism by which the state can encourage energy-efficiency through various means for School Districts, State Facilities and Political Jurisdictions in Texas.

HB 3693 includes the following state-wide mandates that apply differently according to the nature and origin of the entity:

Record, Report and Display Consumption Data

All Political Subdivisions, School Districts and State-Funded Institutes of Higher Education, are mandated to record and report the entity's metered resource consumption usage data for electricity, natural gas and water on a publically accessible internet page. *Note: The format, content and display of this information are determined by the entity or subdivision providing this information.*

Energy Efficient Light Bulbs

All School Districts and State-Funded Institutes of Higher Education shall purchase and use energy-efficient light bulbs in education and housing facilities.

Who must comply?

The provisions in this bill will apply to entities including: Cities and Counties; School Districts; Institutes of Higher Education; State Facilities and Buildings.

How do you define energy-efficiency measures?

Energy-efficiency measures are defined as any facility modifications or changes in operations that reduce energy consumption. Energy-efficiency is a strategy that has the potential to conserve resources, save money** and better the quality of our air. They provide immediate savings and add minimal costs to your project budget.

Examples of energy-efficiency measures include:

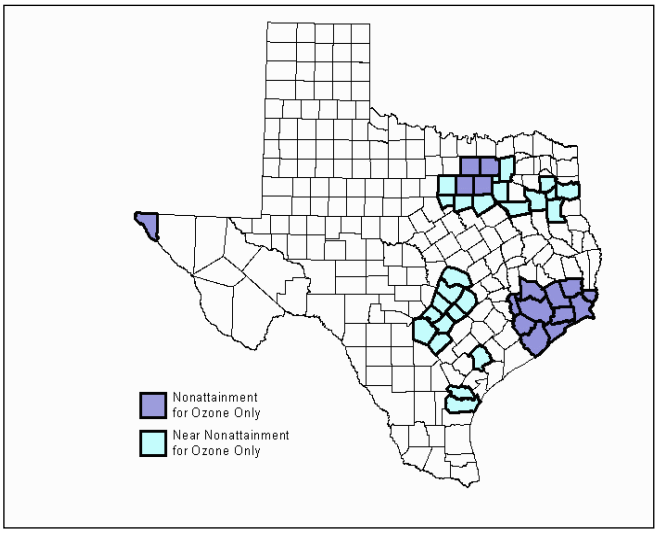
• installation of insulation and high-efficiency windows and doors • modifications or replacement of HVAC systems, lighting fixtures and electrical systems • installation of automatic energy control systems • installation of energy recovery systems or renewable energy generation equipment • building commissioning • development of energy efficient procurement specifications • employee awareness campaigns

***SECO's Preliminary Energy Assessment (PEA) program is an excellent resource for uncovering those energy-efficiency measures that can benefit your organization.*

What counties are affected?

All political jurisdictions located in the following Non-attainment and affected counties:

Bastrop Bexar Brazoria Caldwell Chambers Collin
Comal Dallas Denton El Paso Ellis Fort Bend
Galveston Gregg Guadalupe Hardin Harris Harrison
Hays Henderson Hood Hunt Jefferson Johnson
Kaufman Liberty Montgomery Nueces Orange Parker
Rockwall Rusk San Patricio Smith Tarrant Travis
Upshur Victoria Waller Williamson Wilson



What assistance is available for affected areas?

The Texas Energy Partnership is a partner with Energy Star©, who partners across the nation with the goal of improving building performance, reducing air emissions through reduced energy demand, and enhancing the quality of life through energy-efficiency and renewable energy technologies.

To assist jurisdictions, the Texas Energy Partnership will:

- Present workshops and training seminars in partnership with private industry on a range of topics that include energy services, financing, building technologies and energy performance rating and benchmarking

- Prepare information packages – containing flyers, documents and national lab reports about energy services, management tools and national, state and industry resources that will help communities throughout the region

- Launch an electronic newsletter to provide continuous updates and develop additional information packages as needed

Please contact Stephen Ross at 512-463-1770 for more information.

SECO Program Contact Information

LoanSTAR;
Preliminary Energy Assessments:
Theresa Sifuentes - 512-463-1896
Theresa.Sifuentes@cpa.state.tx.us

Schools Partnership Program:
Glenda Baldwin - 512-463-1731
Glenda.Baldwin@cpa.state.tx.us

Engineering (Codes / Standards):
Felix Lopez - 512-463-1080
Felix.Lopez@cpa.state.tx.us

Innovative / Renewable Energy:
Pamela Groce - 512-463-1889
pam.groce@cpa.state.tx.us

Energy / Housing
Partnership Programs:
Stephen Ross - 512-463-1770
Stephen.Ross@cpa.state.tx.us

Alternate Fuels / Transportation:
Mary-Jo Rowan - 512-463-2637
Mary-Jo.Rowan@cpa.state.tx.us

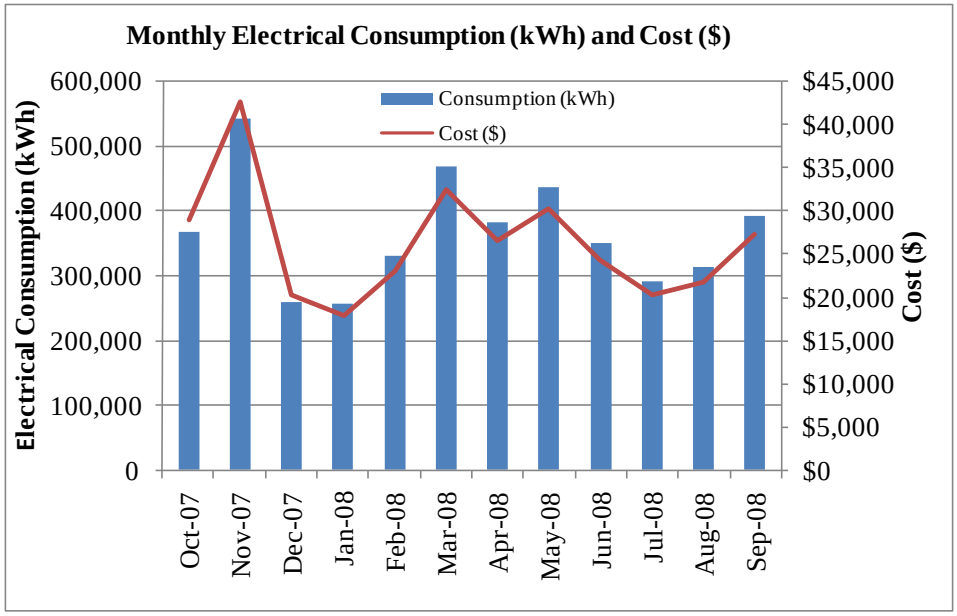
APPENDIX B

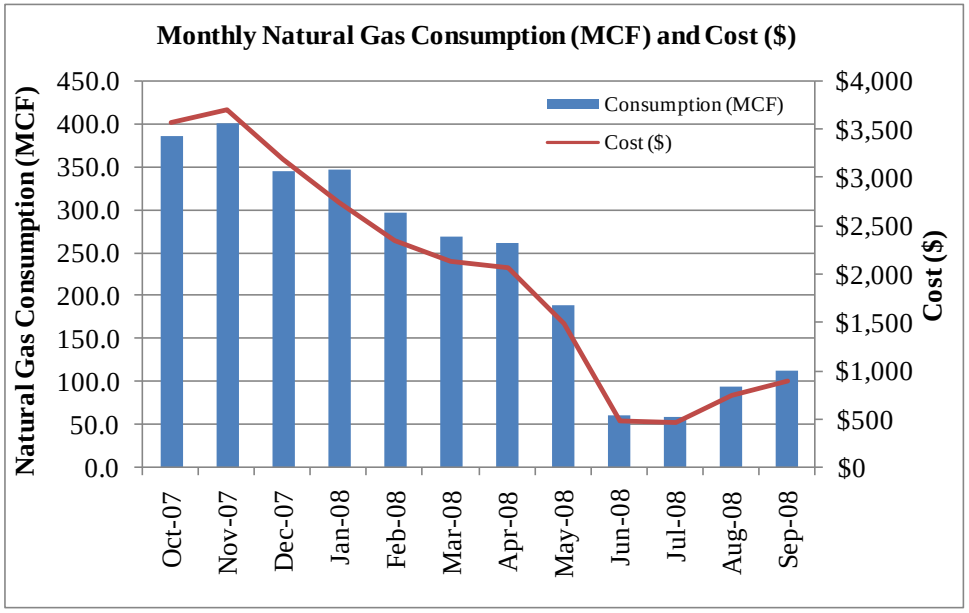
SAMPLE ENERGY REPORTING FORM

Lackland ISD - Sample Utility Data Input Form

MONTH	ELECTRICITY			NATURAL GAS			WATER		
	KWH	COST $	$/KWH	MCF	COST $	$/MCF	GAL	COST $	$/GAL
Oct-07	366,047	$28,841	$0.0788	385.9	$3,562	$9.2			
Nov-07	539,842	$42,534	$0.0788	400.6	$3,699	$9.2			
Dec-07	257,578	$20,295	$0.0788	345.1	$3,187	$9.2			
Jan-08	256,723	$17,868	$0.0696	346.9	$2,735	$7.9			
Feb-08	329,762	$22,952	$0.0696	296.6	$2,339	$7.9			
Mar-08	466,666	$32,481	$0.0696	269.4	$2,124	$7.9			
Apr-08	381,957	$26,585	$0.0696	261.7	$2,063	$7.9			
May-08	434,744	$30,259	$0.0696	188.1	$1,483	$7.9			
Jun-08	348,168	$24,233	$0.0696	60.6	$478	$7.9			
Jul-08	290,264	$20,203	$0.0696	58.9	$464	$7.9			
Aug-08	311,658	$21,692	$0.0696	94.2	$743	$7.9			
Sep-08	390,829	$27,202	$0.0696	113.6	$896	$7.9			
Total	4,374,238	$315,144	$0.0720	2,822	$23,772	$8.4			

Gross Building Area:	277,590	SF





APPENDIX C

BASE YEAR CONSUMPTION HISTORY

LACKLAND ISD – UTILITY METER MAP

Image Source: Microsoft© LiveSearch Maps

Energy Cost and Cosumption Benchmarks

		Electric		Natural Gas		Total	Total	EUI	ECI	
Group	Building	KWH/Yr	$Cost/Yr	MCF/Yr	$Cost/Yr	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
1	Bus Maint. (1)	16,962	1,217	187	1,577	2,794	251	52	0.57	4,860
2	Elem. 1 - 2 (2)	532,280	40,029	460	3,861	43,889	2,291	57	1.09	40,309
3	Pre-k, Elem Gym (3)	611,400	43,460	12	96	43,556	2,099	48	0.99	44,145
4	HS, MS, HS Gym, Café (4)	2,338,880	167,495	172	1,445	168,940	8,159	67	1.38	122,056
5	Maint. Bldg. (5)	44,600	3,224	155	1,274	4,498	312	36	0.53	8,564
6	Admin. Bldg. (6)	67,296	4,838	110	906	5,744	343	58	0.97	5,920
7	New Elem Wing (7)	740,720	53,289	1,694	14,360	67,649	4,273	85	1.35	50,000
8	Music Room (8)	22,100	1,592	31	253	1,846	107	62	1.06	1,736
		KWH/Yr	$Cost/Yr	MCF/Yr	$Cost/Yr	$Cost/Yr	MMBTU/Yr	kBTU/SF/Yr	$/SF/Yr	SF
		4,374,238	315,144	2,822	23,772	338,917	17,836	64	1.22	277,590

(1) Included Bldg. - 5290
(2) Includes Bldgs. - 8220, 8224, 8226, 8228, 8230, 8232
(3) Includes Bldgs. - 8222, 8218E, 8218
(4) Includes Bldgs. - 8240, 8238, 8234, 8236, 8242, 8244, 8246, 8248
(5) Includes Bldg. - 8254
(6) Includes Bldg. - 8265
(7) Includes Bldgs. - 8350, 8352, 8354
(8) Includes Bldg. - 8225

Group 1

District: Lackland ISD

ACCOUNT# 1 _____ Electric

1 _____ Gas

BUILDING: Bus Maint. (1)

FLOOR AREA: 4,860

		Electrical					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
October	2007	1,499				118	0	0
November	2007	1,314				104	22	200
December	2007	1,170				92	53	491
January	2008	1,355				94	58	456
February	2008	1,314				91	42	327
March	2008	778				54	13	102
April	2008	1,269				88	0	0
May	2008	1,576				110	0	0
June	2008	1,920				134	0	0
July	2008	1,576				110	0	0
August	2008	1,770				123	0	0
September	2008	1,421				99	0	0
TOTAL		16,962				1,217	187.3	1,577

(1) Bldg. Included - 5290

Annual Total Energy Cost = 2,794 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 52 kBTU/SF/year

Total KWH/yr x 0.003413 = 57.89 MMBTU/year

Total MCF/yr x 1.03 = 192.92 MMBTU/year

Total Other x _____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 251 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 0.57 $/SF/year

Electric Utility: Lackland AFB

Gas Utility: Lackland AFB

Group 2

District: Lackland ISD

ACCOUNT# 2 Electric

4 11 Gas

BUILDING: Elem. 1 - 2 (2) FLOOR AREA**: 40,309

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
October	2007	43,400				3,419	49	456
November	2007	260,880				20,555	51	469
December	2007	20,160				1,588	71	654
January	2008	23,280				1,620	78	617
February	2008	26,400				1,837	56	442
March***	2008	26,400				1,837	41	320
April	2008	31,440				2,188	34	266
May	2008	24,960				1,737	23	184
June	2008	17,760				1,236	6	46
July	2008	33,360				2,322	15	121
August	2008	240				17	13	105
September	2008	24,000				1,670	23	180
TOTAL		532,280				40,029	460.4	3,861

(2) Bldgs Included - 8220, 8224, 8226, 8228, 8230, 8232

** Estimated SF for Bldg. 8226 & 8230 *** Estimated Electric Consumption

Energy Use Index:

Annual Total Energy Cost = 43,889 $/year

Total site BTU's/Yr ÷ Total Area (SF) = 57 kBTU/SF/year

Total KWH/yr x 0.003413 = 1,816.67 MMBTU/year

Total MCF/yr x 1.03 = 474.23 MMBTU/year

Total Other x _____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 2,291 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.09 $/SF/year

Electric Utility: Lackland AFB

Gas Utility: Lackland AFB

Group 3

District: Lackland ISD

ACCOUNT# 3 Electric

3 Gas

BUILDING: Pre-k, Elem Gym (3)

FLOOR AREA: 44,145

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
October	2007	45,240				3,564	0	0
November	2007	23,040				1,815	0	0
December	2007	30,240				2,383	0	0
January	2008	27,840				1,938	0	0
February	2008	34,560				2,405	2	17
March	2008	27,480				1,913	0	0
April**	2008	27,480				1,913	0	0
May	2008	71,760				4,995	10	80
June	2008	16,680				1,161	0	0
July	2008	133,320				9,279	0	0
August**	2008	133,320				9,279	0	0
September	2008	40,440				2,815	0	0
TOTAL		611,400				43,460	12.2	96

(3) Includes Bldgs. - 8222, 8218E, 8218

** Estimated Electric Consumption

Annual Total Energy Cost = 43,556 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 48 kBTU/SF/year

Total KWH/yr x 0.003413 = 2,086.71 MMBTU/year

Total MCF/yr x 1.03 = 12.56 MMBTU/year

Total Other x _____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 2,099 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 0.99 $/SF/year

Electric Utility: Lackland AFB

Gas Utility: Lackland AFB

Group 4

District: Lackland ISD

ACCOUNT# 4 Electric

2 6 Gas

BUILDING: HS, MS, HS Gym, Café (4)

FLOOR AREA**: 122,056

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
October	2007	181,840				14,327	12	112
November***	2007	181,840				14,327	23	211
December	2007	148,400				11,692	33	305
January	2008	150,000				10,440	43	339
February	2008	186,000				12,946	18	145
March	2008	372,000				25,892	13	99
April	2008	230,000				16,008	1	11
May	2008	244,800				17,038	17	131
June	2008	229,600				15,981	1	9
July	2008	86,400				6,014	5	36
August***	2008	86,400				6,014	3	26
September	2008	241,600				16,816	3	22
TOTAL		2,338,880				167,495	171.7	1,445

(4) Includes Bldgs. - 8240, 8238, 8234, 8236, 8242, 8244, 8246, 8248

** Estimated SF for Bldg. 8240 ***Estimated Electric Consumption

Energy Use Index:

Annual Total Energy Cost = 168,940 $/year

Total site BTU's/Yr ÷ Total Area (SF) = 67 kBTU/SF/year

Total KWH/yr x 0.003413 = 7,982.60 MMBTU/year

Total MCF/yr x 1.03 = 176.86 MMBTU/year

Total Other x _____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 8,159 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.38 $/SF/year

Electric Utility: Lackland AFB

Gas Utility: Lackland AFB

Group 5

District: Lackland ISD

ACCOUNT# 6 Electric

8 Gas

BUILDING: Maint. Bldg. (5)

FLOOR AREA: 8,564

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
October	2007	6,480				511	13	120
November	2007	1,760				139	13	119
December	2007	4,840				381	13	119
January	2008	840				58	13	102
February	2008	3,120				217	13	102
March	2008	2,200				153	13	102
April	2008	3,880				270	13	102
May	2008	4,320				301	13	102
June	2008	5,200				362	13	102
July	2008	3,080				214	13	102
August	2008	4,840				337	13	102
September	2008	4,040				281	13	102
TOTAL		44,600				3,224	154.9	1,274

(5) Includes Bldg. - 8254

Annual Total Energy Cost = 4,498 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 36 kBTU/SF/year

Total KWH/yr x 0.003413 = 152.22 MMBTU/year

Total MCF/yr x 1.03 = 159.55 MMBTU/year

Total Other x _____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 312 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 0.53 $/SF/year

Electric Utility: Lackland AFB

Gas Utility: Lackland AFB

Group 6

District: Lackland ISD

ACCOUNT# 7 Electric

9 Gas

BUILDING: Admin. Bldg. (6)

FLOOR AREA: 5,920

		ELECTRICAL*					NATURAL GAS / FUEL*	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
October	2007	5,608				442	9	85
November	2007	5,608				442	9	85
December	2007	5,608				442	9	85
January	2008	5,608				390	9	72
February	2008	5,608				390	9	72
March	2008	5,608				390	9	72
April	2008	5,608				390	9	72
May	2008	5,608				390	9	72
June	2008	5,608				390	9	72
July	2008	5,608				390	9	72
August	2008	5,608				390	9	72
September	2008	5,608				390	9	72
TOTAL		67,296				4,838	110.2	906

(6) Includes Bldg. - 8265

* Electric and Natural Gas Data based on LAFB estimates.

Annual Total Energy Cost = 5,744 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 58 kBTU/SF/year

Total KWH/yr x 0.003413 = 229.68 MMBTU/year

Total MCF/yr x 1.03 = 113.50 MMBTU/year

Total Other x _____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 343 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 0.97 $/SF/year

Electric Utility: Lackland AFB

Gas Utility: Lackland AFB

Group 7

District: Lackland ISD

ACCOUNT# 8 Electric

10 Gas

BUILDING: New Elem Wing (7)

FLOOR AREA**: 50,000

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
October	2007	79,680				6,278	299	2,760
November	2007	63,600				5,011	281	2,592
December	2007	45,360				3,574	164	1,510
January	2008	46,000				3,202	143	1,130
February	2008	70,960				4,939	154	1,214
March	2008	30,400				2,116	179	1,409
April	2008	80,480				5,602	202	1,593
May	2008	79,920				5,563	114	895
June	2008	69,600				4,844	29	229
July	2008	25,120				1,748	14	114
August	2008	77,680				5,407	53	417
September	2008	71,920				5,006	63	500
TOTAL		740,720				53,289	1,694.3	14,360

(7) Includes Bldgs. - 8350, 8352, 8354

** Estimated Square Footage

Annual Total Energy Cost = 67,649 $/year

Energy Use Index:

Total site BTU's/Yr ÷ Total Area (SF) = 85 kBTU/SF/year

Total KWH/yr x 0.003413 = 2,528.08 MMBTU/year

Total MCF/yr x 1.03 = 1,745.13 MMBTU/year

Total Other x _____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 4,273 MMBTU/year

Energy Cost Index:

Total Energy Cost/Yr ÷ Total Area (SF) = 1.35 $/SF/year

Electric Utility: Lackland AFB

Gas Utility: Lackland AFB

Group 8

District: Lackland ISD

ACCOUNT# 5 Electric

7 Gas

BUILDING: Music Room (8)

FLOOR AREA: 1,736

		ELECTRICAL					NATURAL GAS / FUEL	
			DEMAND			TOTAL ALL		
		CONSUMPTION	METERED	CHARGED	COST OF	ELECTRIC	CONSUMPTION	TOTAL
MONTH	YEAR	KWH	KW	KW	DEMAND ($)	COSTS ($)	MCF	COSTS ($)
October	2007	2,300				181	3	30
November	2007	1,800				142	3	23
December	2007	1,800				142	3	23
January	2008	1,800				125	3	20
February	2008	1,800				125	3	20
March	2008	1,800				125	3	20
April	2008	1,800				125	3	20
May	2008	1,800				125	3	20
June	2008	1,800				125	3	20
July	2008	1,800				125	3	20
August	2008	1,800				125	3	20
September	2008	1,800				125	3	20
TOTAL		22,100				1,592	30.7	253

(8) Includes Bldg. - 8225

Energy Use Index:

Annual Total Energy Cost = 1,846 $/year

Total site BTU's/Yr ÷ Total Area (SF) = 62 kBTU/SF/year

Total KWH/yr x 0.003413 = 75.43 MMBTU/year

Total MCF/yr x 1.03 = 31.62 MMBTU/year

Total Other x _____ = 0.0 MMBTU/year

Total Site MMBTU's/yr = 107 MMBTU/year

Energy Cost Index:

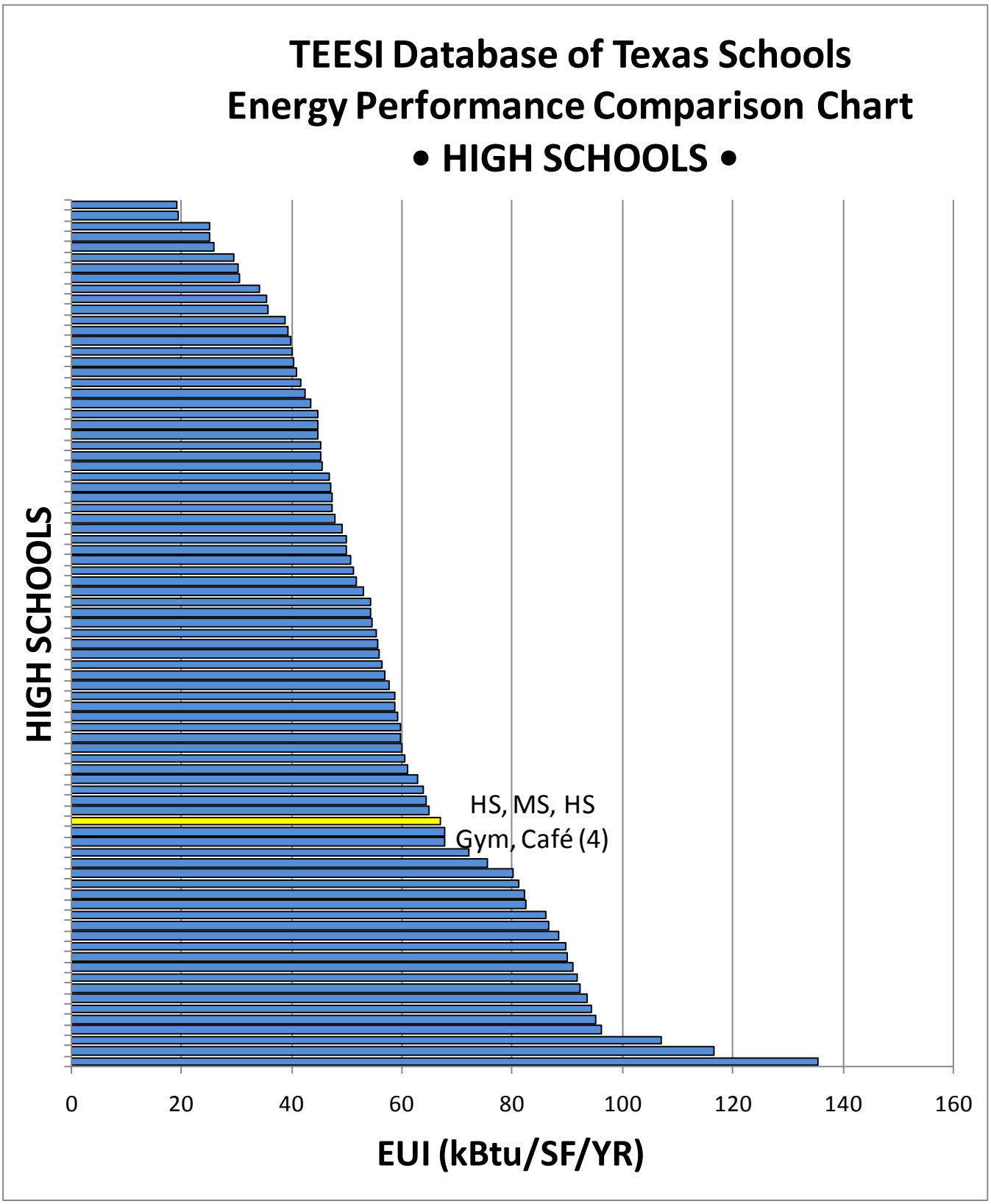
Total Energy Cost/Yr ÷ Total Area (SF) = 1.06 $/SF/year

Electric Utility: Lackland AFB

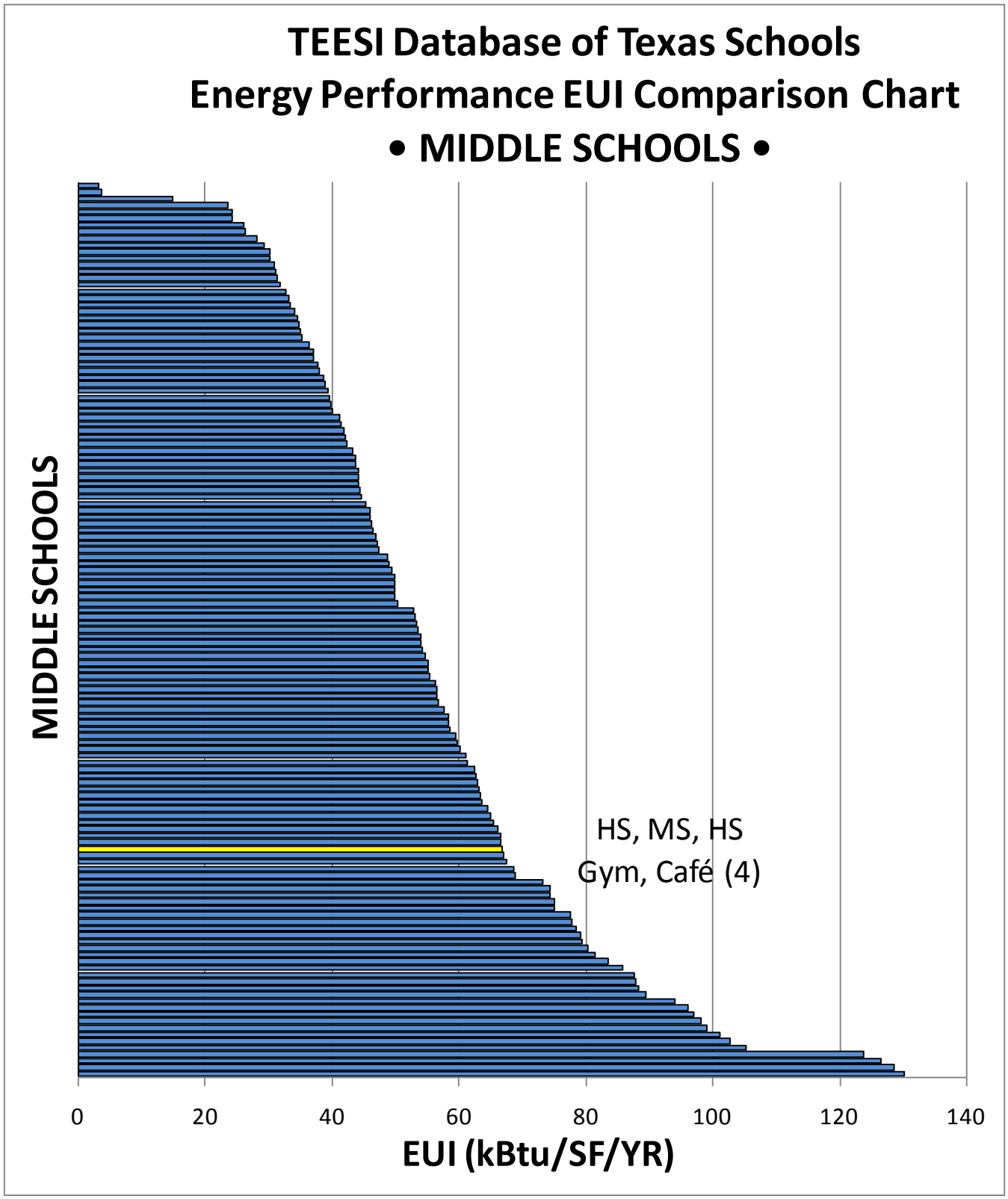
Gas Utility: Lackland AFB

APPENDIX D

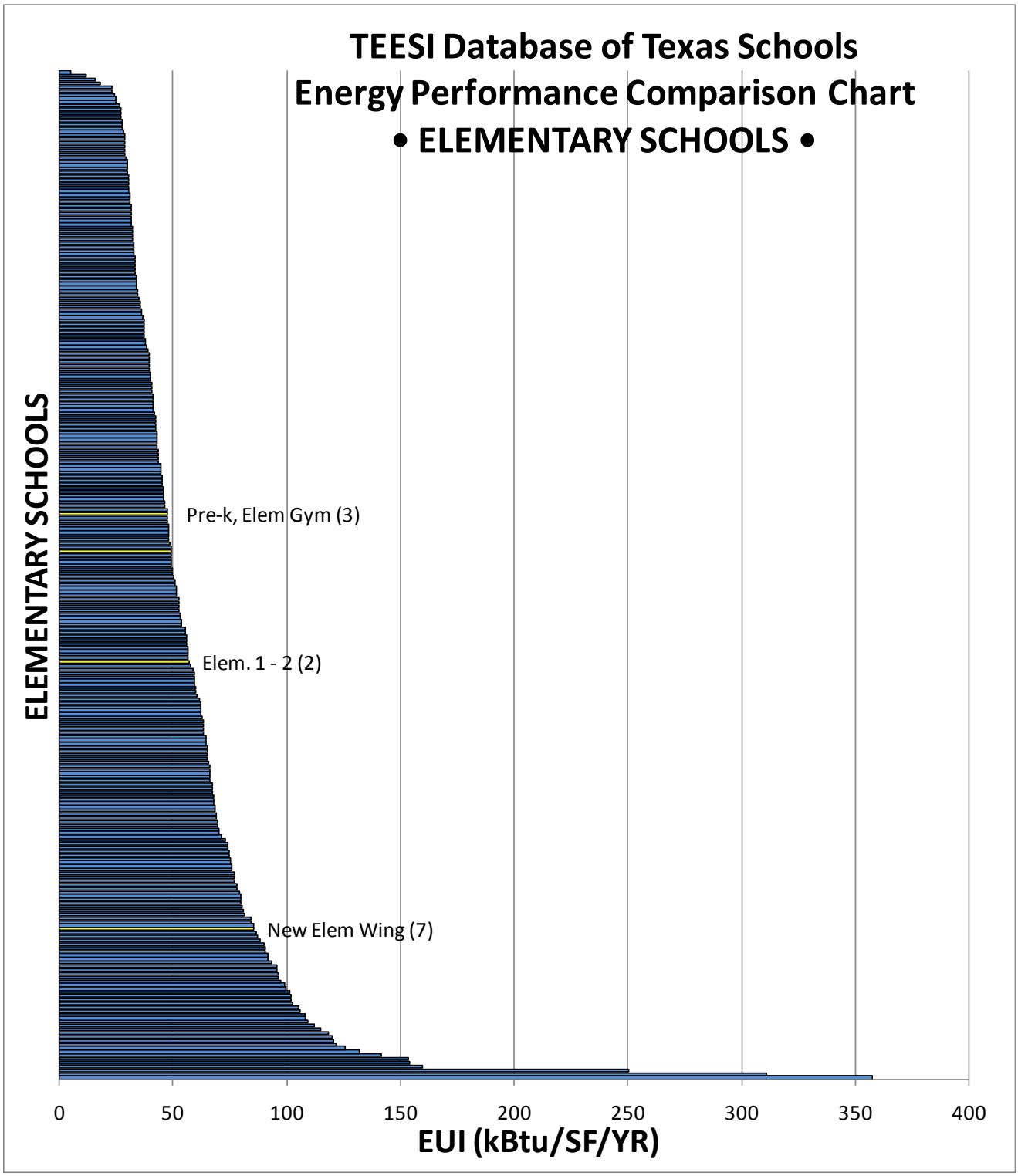
ENERGY PERFORMANCE COMPARISON CHARTS



(The chart above is a comparison of EUIs based on sample data from TEESI's database of Texas Schools)



(The chart above is a comparison of EUIs based on sample data from TEESI's database of Texas Schools)



(The chart above is a comparison of EUIs based on sample data from TEESI's database of Texas Schools)

APPENDIX E

TYPICAL EQUIPMENT MAINTENANCE CHECKLISTS

Boilers Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
Boiler use/sequencing	Turn off/sequence unnecessary boilers	X			
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Follow manufacturer's recommended procedures in lubricating all components	Compare temperatures with tests performed after annual cleaning	X			
Check steam pressure	Is variation in steam pressure as expected under different loads? Wet steam may be produced if the pressure drops too fast	X			
Check unstable water level	Unstable levels can be a sign of contaminates in feedwater, overloading of boiler, equipment malfunction	X			
Check burner	Check for proper control and cleanliness	X			
Check motor condition temperatures	Check for proper function	X			
Check air temperatures in boiler room	Temperatures should not exceed or drop below design limits	X			
Boiler blowdown	Verify the bottom, surface and water column blow downs are occurring and are effective	X			
Boiler logs	Keep daily logs on: • Type and amount of fuel used • Flue gas temperature • Makeup water volume • Steam pressure, temperature, and amount generated Look for variations as a method of fault detection	X			
Check oil filter assemblies	Check and clean/replace oil filters and strainers	X			
Inspect oil heaters	Check to ensure that oil is at proper temperature prior to burning	X			
Check boiler water treatment	Confirm water treatment system is functioning properly	X			
Check flue gas temperatures and composition	Measure flue gas composition and temperatures at selected firing positions - recommended O2% and CO2% Fuel — O2 % — CO2% Natural gas — 1.5 — 10 No. 2 fuel oil — 2.0 — 11.5 No. 6 fuel oil — 2.5 — 12.5 Note: percentages may vary due to fuel composition variations		X		

Source: FEMP, "Operation & Maintenance Best Practices, A Guide to Achieving Operational Efficiency", July 2004

Boilers Checklist (contd)

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
Check all relief valves	Check for leaks		X		
Check water level control	Stop feedwater pump and allow control to stop fuel flow to burner. Do not allow water level to drop below recommended level.		X		
Check pilot and burner assemblies	Clean pilot and burner following manufacturer's guidelines. Examine for mineral or corrosion buildup.		X		
Check boiler operating characteristics	Stop fuel flow and observe flame failure. Start boiler and observe characteristics of flame.		X		
Inspect system for water/steam leaks and leakage opportunities	Look for: leaks, defective valves and traps, corroded piping, condition of insulation		X		
Inspect all linkages on combustion air dampers and fuel valves	Check for proper setting and tightness		X		
Inspect boiler for air leaks	Check damper seals		X		
Check blowdown and water treatment procedures	Determine if blowdown is adequate to prevent solids buildup			X	
Flue gases	Measure and compare last month's readings flue gas composition over entire firing range			X	
Combustion air supply	Check combustion air inlet to boiler room and boiler to make sure openings are adequate and clean			X	
Check fuel system	Check pressure gauge, pumps, filters and transfer lines. Clean filters as required.			X	
Check belts and packing glands	Check belts for proper tension. Check packing glands for compression leakage.			X	
Check for air leaks	Check for air leaks around access openings and flame scanner assembly.			X	
Check all blower belts	Check for tightness and minimum slippage.			X	
Check all gaskets	Check gaskets for tight sealing, replace if do not provide tight seal			X	
Inspect boiler insulation	Inspect all boiler insulation and casings for hot spots			X	
Steam control valves	Calibrate steam control valves as specified by manufacturer			X	
Pressure reducing/regulating valves	Check for proper operation			X	

Source: FEMP, "Operation & Maintenance Best Practices, A Guide to Achieving Operational Efficiency", July 2004

Boilers Checklist (contd)

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
Perform water quality test	Check water quality for proper chemical balance			X	
Clean waterside surfaces	Follow manufacturer's recommendation on cleaning and preparing waterside surfaces				X
Clean fireside	Follow manufacturer's recommendation on cleaning and preparing fireside surfaces				X
Inspect and repair refrac-tories on fireside	Use recommended material and procedures				X
Relief valve	Remove and recondition or replace				X
Feedwater system	Clean and recondition feedwater pumps. Clean condensate receivers and deaeration system				X
Fuel system	Clean and recondition system pumps, filters, pilot, oil preheaters, oil storage tanks, etc.				X
Electrical systems	Clean all electrical terminals. Check electronic controls and replace any defective parts.				X
Hydraulic and pneumatic valves	Check operation and repair as necessary				X
Flue gases	Make adjustments to give optimal flue gas composition. Record composition, firing position, and temperature.				X
Eddy current test	As required, conduct eddy current test to assess tube wall thickness				X

Source: FEMP, "Operation & Maintenance Best Practices, A Guide to Achieving Operational Efficiency", July 2004

Chillers Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Semi-Annually	Annually
Chiller use/sequencing	Turn off/sequence unnecessary chillers	X			
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Check setpoints	Check all setpoints for proper setting and function	X			
Evaporator and condenser coil fouling	Assess evaporator and condenser coil fouling as required		X		
Compressor motor temperature	Check temperature per manufacturer's specifications		X		
Perform water quality test	Check water quality for proper chemical balance		X		
Leak testing	Conduct leak testing on all compressor fittings, oil pump joints and fittings, and relief valves		X		
Check all insulation	Check insulation for condition and appropriateness		X		
Control operation	Verify proper control function including: • Hot gas bypass • Liquid injection		X		
Check vane control settings	Check settings per manufacturer's specification			X	
Verify motor load limit control	Check settings per manufacturer's specification			X	
Verify load balance operation	Check settings per manufacturer's specification			X	
Check chilled water reset settings and function	Check settings per manufacturer's specification			X	
Check chiller lockout setpoint	Check settings per manufacturer's specification				X
Clean condenser tubes	Clean tubes at least annually as part of shutdown procedure				X

Source: FEMP, "Operation & Maintenance Best Practices, A Guide to Achieving Operational Efficiency", July 2004

Building Controls Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Semi-Annually	Annually
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Verify control schedules	Verify in control software that schedules are accurate for season, occupancy, etc.	X			
Verify setpoints	Verify in control software that setpoints are accurate for season, occupancy, etc.	X			
Time clocks	Reset after every power outage	X			
Check all gauges	Check all gauges to make sure readings are as expected		X		
Control tubing (pneumatic system)	Check all control tubing for leaks		X		
Check outside air volumes	Calculated the amount of outside air introduced and compare to requirements		X		
Check setpoints	Check setpoints and review rational for setting		X		
Check schedules	Check schedules and review rational for setting		X		
Check deadbands	Assure that all deadbands are accurate and the only simultaneous heating and cooling is by design		X		
Check sensors	Conduct thorough check of all sensors - temperature, pressure, humidity, flow, etc. - for expected values			X	
Time clocks	Check for accuracy and clean			X	
Calibrate sensors	Calibrate all sensors: temperature, pressure, humidity, flow, etc.				X

Source: FEMP, "Operation & Maintenance Best Practices, A Guide to Achieving Operational Efficiency", July 2004

Pumps Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
Pump use/sequencing	Turn off/sequence unnecessary pumps	X			
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Check lubrication	Assure that all bearings are lubricated per the manufacture's recommendation			X	
Check packing	Check packing for wear and repack as necessary. Consider replacing packing with mechanical seals.			X	
Motor/pump alignment	Aligning the pump/motor coupling allows for efficient torque transfer to the pump			X	
Check mountings	Check and secure all pump mountings			X	
Check bearings	Inspect bearings and drive belts for wear. Adjust, repair, or replace as necessary.				X
Motor condition	Checking the condition of the motor through temperature or vibration analysis assures long life				X

Source: FEMP, "Operation & Maintenance Best Practices, A Guide to Achieving Operational Efficiency", July 2004

Fans Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
System use/sequencing	Turn off/sequence unnecessary equipment	X			
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Observe belts	Verify proper belt tension and alignment			X	
Inspect pulley wheels	Clean and lubricate where required			X	
Inspect dampers	Confirm proper and complete closure control; outside air dampers should be airtight when closed			X	
Observe actuator/linkage control	Verify operation, clean, lubricate, adjust as needed			X	
Check fan blades	Validate proper rotation and clean when necessary			X	
Filters	Check for gaps, replace when dirty - monthly			X	
Check for air quality anomalies	Inspect for moisture/growth on walls, ceilings, carpets, and in/outside of duct-work. Check for musty smells and listen to complaints.			X	
Check wiring	Verify all electrical connections are tight				X
Inspect ductwork	Check and refasten loose connections, repair all leaks				X
Coils	Confirm that filters have kept clean, clean as necessary				X
Insulation	Inspect, repair, replace all compromised duct insulation				X

Source: FEMP, "Operation & Maintenance Best Practices, A Guide to Achieving Operational Efficiency", July 2004

Electric Motors Checklist

Description	Comments	Maintenance Frequency			
		Daily	Weekly	Monthly	Annually
Motor use/sequencing	Turn off/sequence unnecessary motors	X			
Overall visual inspection	Complete overall visual inspection to be sure all equipment is operating and safety systems are in place	X			
Motor condition	Check the condition of the motor through temperature or vibration analysis and compare to baseline values		X		
Check lubrication	Assure that all bearings are lubricated per the manufacture's recommendation			X	
Check packing	Check packing for wear and repack as necessary. Consider replacing packing with mechanical seals.			X	
Motor alignment	Aligning the motor coupling allows for efficient torque transfer to the pump			X	
Check mountings	Check and secure all motor mountings			X	
Check terminal tightness	Tighten connection terminals as necessary			X	
Cleaning	Remove dust and dirt from motor to facilitate cooling			X	
Check bearings	Inspect bearings and drive belts for wear. Adjust, repair, or replace as necessary.				X
Motor condition	Checking the condition of the motor through temperature or vibration analysis assures long life				X
Check for balanced three-phase power	Unbalanced power can shorten the motor life through excessive heat build up				X
Check for over-voltage or under-voltage conditions	Over- or under-voltage situations can shorten the motor life through excessive heat build up				X

Source: FEMP, "Operation & Maintenance Best Practices, A Guide to Achieving Operational Efficiency", July 2004

APPENDIX F

WATT WATCHERS PROGRAM

Watt Watchers of Texas

Saving Energy in Texas Schools

1-888-US WATTS

or

1-888-WATTEAM

Watt Watchers of Texas is a free, state sponsored program to help schools save energy and money by getting students involved. Students patrol their school looking for empty classrooms with the lights on. They turn out the lights and leave a ticket for the teacher. It may sound trivial but...when the teacher forgets to turn out the lights an extra 2 hours per day, at lunch and after school, for example - it costs the district $50 every year.

Get your students involved.
Save energy, save money,
and prevent pollution.

Sign Up for a free kit today.

Watt Watchers of Texas
University of Texas at El Paso – Energy Center
PO Box 68660
El Paso, Texas 79968
://wattwatchers.org

Watt Watchers of Texas is sponsored by the Texas State Energy Conservation Office/Comptroller of Public Accounts and the U.S. Department of Energy

APPENDIX G

LOANSTAR INFORMATION

Texas LoanSTAR Program

FACTS ABOUT LoanSTAR

The State of Texas LoanSTAR (Saving Taxes and Resources) Program finances energy efficient facility up-grades for state agencies, public schools, institutions of higher education, local governments, municipalities, and hospitals. The program's revolving loan mechanism allows participants to borrow money and repay all project costs through the stream of **cost savings** produced.

ELIGIBLE PROJECTS

Up-grades financed through the program include, but are not limited to, (1) energy efficient lighting systems; (2) high efficiency heating, ventilation and air conditioning systems; (3) energy management systems; (4) boiler efficiency improvements; (5) energy recovery systems; (6) building shell improvements; and (7) load management projects. The prospective borrower hires a Professional Engineer to analyze the potential energy efficient projects that will be submitted for funding through the Loan STAR Program. All engineering costs are covered under the program.

PROGRAM REQUIREMENTS

Once the projects are analyzed and the prospective borrower agrees with the recommended projects, the engineer prepares an Energy Assessment Report (EAR) with the project descriptions and calculations. The EAR must be prepared according to the LoanSTAR Technical Guidelines. The EAR is reviewed and approved by the State Energy Conservation Office (SECO) technical staff before project financing is authorized. Projects financed by LoanSTAR must have an average simple payback of ten years or less. Borrowers do, however, have the option of buying down paybacks to meet the composite ten-year limit.

To ensure up-grade projects are designed and constructed according to the EAR, SECO performs a review of the design documents at the 50% and 100% completion phases. On-site construction monitoring is also performed at the 50% and 100% completion phases.

SAVINGS VERIFICATION

To ensure that the Borrower is achieving the estimated energy savings, monitoring and verification is required for all LoanSTAR funded projects. The level of monitoring and verifications may range from utility bill analysis to individual system or whole building metering depending on the size and type of retrofit projects. If whole building metering is required, metering and monitoring cost can be rolled into the loan.

For additional information regarding the
LoanSTAR program, please contact:

Theresa Sifuentes
SECO, LoanSTAR Program Manager
(512) 463-1896

APPENDIX H

DESCRIPTION OF SECO PROGRAMS

Texas State Energy Conservation Office (SECO)

The Texas State Energy Conservation Office (SECO) helps Texas make the most of domestic energy, reduce state and local government energy costs and promote cost-effective, clean-energy technologies. SECO's mission is to maximize energy efficiency while protecting the environment.

LoanSTAR Revolving Loan Program: has saved taxpayers more than $224.6 million through energy-efficiency projects for state agencies, institutions of higher education, school districts, county hospitals and local governments. Borrowers repay loans through cost savings generated by the projects. LoanSTAR-funded projects have also prevented the release of 7,781 tons of nitrogen oxides (NOx), 2.3 million tons of carbon dioxide (CO2) and 5,339 tons of sulfur dioxide (SO2).

Schools/Local Government Energy Program: has helped more than 3,500 schools and other units of local government set up and maintain effective energy-efficiency programs. SECO provides facility preliminary energy assessments, energy management training workshops, technical support in designing new facilities and on-site training for student energy awareness projects. Clean energy technologies are demonstrated at public facilities and school districts to increase awareness and address air quality at the community level. Texas schools also employ the computer power management software that puts monitors to "sleep" when not in use. Over 136,000 school computers now use this software, saving 42 million kWh and reducing energy costs by $3 million annually.

Energy Education Program: promotes energy conservation and efficiency through education. The program strives to lay the foundation for environmental stewardship in teachers and students through critical-thinking and problem-solving investigations in Texas Education Agency approved workshops. Over 2,500 teachers have attended these workshops and utilized the materials in their classrooms reaching over 375,000 students. The program also supports fuel cell technical training curriculum development at the college level.

State Agencies/Higher Education Program: ensures that new facilities are designed and built with energy efficiency and water conservation in mind. Projects include administration and maintenance of the Energy and Water Conservation Design Standard for new state buildings and major renovation projects. Other initiatives include development of statewide employee energy awareness through workshops on how energy efficiency and employee behavior can reduce energy use. The program provides educational materials on how to use energy more efficiently through product procurement, innovative technologies and sustainable design practices. This program also provides education and outreach on residential and commercial energy codes statewide. The goal is to demonstrate the clear benefits of energy codes and standards in improving the quality of life, the environment and the safety and health of communities.

Alternative Fuels Program: demonstrates the positive environmental impact, technical feasibility and energy efficiency of domestically-produced alternative fuels. The Alternative Fuels Program is designed to assist state agencies, school districts, local government and private fleets to operate more of their fleets on alternative fuels. Initiatives include support for the Clean Cities Program, Clean School Bus USA Program, Mechanics Education Outreach and Air Quality Demonstration Projects.

Energy Management Services: a comprehensive energy management program designed to significantly reduce energy and utility expenditures in state-owned facilities. The State of Texas spent over $216 million in energy and utility expenditures in 2006. Program components include construction of a state-of-the-art energy and utility information management system, a comprehensive analysis of historic and future utility bills, energy procurement at the lowest possible rates and best available terms, and owner's representative services on ongoing and future energy-conservation projects. Institutions of higher education, state university systems and local governments are eligible to participate in the program.

Innovative Energy Program: promotes the use of renewable energy and sustainable building practices through technology demonstration, hands-on instruction and renewable energy education. Renewable energy has significant economic, security and reliability benefits and opportunities for Texas communities and individuals as they develop and use these resources. SECO increases public awareness of Texas' vast renewable energy resources and provides the public better access to vendors, financing options, and renewable energy incentives through its educational web site, The Infinite Power of Texas, at .infinitepower.org.

Housing Partnership Program: promotes the efficient use of energy in low-to-moderate-income housing through partnerships among nonprofit organizations, community action agencies, local governments, utility companies, public housing authorities and social service organizations. The program encourages community and residential involvement in energy-efficiency projects such as housing retrofits, model demonstration projects, technical training assistance and energy education workshops and seminars.

Pollution Mitigation Program: assists political subdivisions in the 41 non-attainment counties to reduce electric consumption in their facilities by implementing cost-effective energy efficiency projects. SECO provides technical support and guidance through the Texas Energy Partnership, a joint initiative involving SECO, the U. S. Department of Energy and ENERGY STAR®. Information, planning tools and electronic reporting are offered at .texasenergypartnership.org.

Pantex Program: The Pantex Nuclear Weapons plant, located in Carson County, is responsible for assembling and disassembling nuclear weapons. The U.S. Department of Energy funds the Texas Agreement in Principle, which SECO has administered since 1990. SECO contracts with a variety of state and local governments to ensure that human health and safety, and the environment, are protected around the plant. The Pantex Program also administers a DOE grant to train local emergency responders along routes that have shipments of radioactive waste going to the Waste Isolation Pilot Plant near Carlsbad, New Mexico, and eventually shipments of spent fuel tentatively scheduled to go to Yucca Mountain in Nevada.

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APPENDIX I

LEED® FOR EXISTING BUILDINGS

Selected pages from LEED® for Existing Buildings: Operations & Maintenance, September 2008

LEED® for Existing Buildings:
Operations & Maintenance

For Public Use and Display

September 2008

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Introduction

A sustainable building maximizes operational efficiency while minimizing environmental impacts. As a cutting-edge, consensus-based system for certifying green building performance, operations and maintenance, the LEED for Existing Buildings: Operations & Maintenance (O&M) Rating System provides a road map for property managers, portfolio owners and service providers who wish to drive down operating costs while increasing occupants' productivity in an environmentally responsible manner.

The LEED for Existing Buildings: O&M Rating System is a set of voluntary performance standards for the sustainable ongoing operation of buildings not undergoing major renovations. It provides sustainability guidelines for building operations, periodic upgrades of building systems, minor space-use changes, and building processes. It is intended to provide existing buildings an entry point into the LEED certification process.

LEED for Existing Buildings: O&M certification is based on actual building operating performance, not design expectations. The certification application must provide data demonstrating that the building's operations meet the LEED for Existing Buildings: O&M prerequisites and attempted credits. The performance of the entire building must be included in measurements and calculations; tenant spaces may not be excluded.

LEED for Existing Buildings: O&M addresses building exterior and site maintenance programs, efficient and optimized use of energy and water, the purchase of environmentally preferred products and food, waste stream management and ongoing indoor environmental quality. In addition, LEED for Existing Buildings: O&M provides sustainability guidelines for whole-building cleaning and maintenance, recycling programs and systems upgrades to improve building energy performance, water consumption, indoor environmental quality and materials use.

To achieve LEED certification, buildings must meet all prerequisites in the Rating System and earn a minimum of 34 points. The flexibility of the Rating System allows building owners, managers and practitioners to determine which credits to pursue based on performance goals. LEED for Existing Buildings: O&M ratings are awarded according to the following point thresholds:

Certified	34–42 points
Silver	43–50 points
Gold	51–67 points
Platinum	68–92 points

Certification Options

The goal of LEED for Existing Buildings: O&M is to help owners improve and operate their buildings in a sustainable and efficient manner, today and in the future. To achieve this goal, LEED for Existing Buildings: O&M provides certification and recertification of building operations to recognize owners' ongoing achievements. LEED for Existing Buildings: O&M can be used to certify the following types of buildings:

- non-LEED buildings seeking initial certification and ongoing certification;
- LEED for New Construction–certified buildings seeking ongoing certification;
- LEED for Schools–certified buildings seeking ongoing certification;
- LEED for Core & Shell–certified buildings seeking ongoing certification; and
- LEED for Existing Buildings–certified buildings seeking ongoing certification.

Buildings previously certified under LEED for New Construction or LEED for Core & Shell have demonstrated

sustainable design and construction and may register for LEED for Existing Buildings: O&M at any time to demonstrate a commitment to sustainable ongoing operations.

Minimum Program Requirements

Buildings must meet the following minimum requirements to pursue certification:

- The building(s) must be fully occupied (defined as average or typical occupancy expected during normal operations) for at least the 12 continuous months preceding certification application. Vacant tenant space measuring 25% or less of the building floor area is permitted, as time-averaged over the previous 12 months. For an apartment building, hotel, dormitory, convention center, classroom, sports facility, or similar structure, ordinary partial occupancy is permitted.
- The LEED project scope must include 100% of the total floor area of each building in the certification application, with the following exception: If operations are under separate management control for a portion of a building, up to 10% of its floor area may be excluded for that reason. Other exemptions are prohibited.
- The building(s) must be in compliance with federal, state and local environmental laws and regulations, including, but not limited to, those addressing asbestos, PCBs, water discharge and waste management. The U.S. Green Building Council reserves the right to revoke LEED certification upon knowledge of noncompliance.

Performance Period

Some credits in LEED for Existing Buildings: O&M require that performance data and other documentation be submitted for the performance period. The *performance period* is the specific, defined time interval for which sustainable operations performance is being measured. The LEED project team may define the duration and timing of the performance period as it sees fit for each prerequisite and credit, subject to the following limitations:

- For the initial LEED for Existing Buildings: O&M certification, the performance period is the most recent period of operations preceding certification application and must be a minimum of three months for all prerequisites and credits except Energy & Atmosphere Prerequisite 2 and Credit 1, which have longer minimum durations. At the project team's option, the performance period for any prerequisite or credit may be extended to a maximum of 24 months preceding certification application.
- For LEED for Existing Buildings: O&M recertification, the performance period depends on whether the credit is newly pursued. For prerequisites and all credits earned in the initial LEED for Existing Buildings: O&M certification, the performance period is the entire period between the previous certification and the current application. For all credits not earned in the initial LEED for Existing Buildings: O&M certification, the performance period is the same as for initial certification.

Policy Model

Any policies required by the LEED for Existing Buildings: O&M Rating System must, at a minimum, contain the following components of the LEED for Existing Buildings: O&M policy model:

1. Scope
   a. Describe the facility management and operations processes to which the policy applies.
   b. Describe the building components, systems and materials to which the policy applies.

2. Performance Metric
   a. Describe how performance will be measured and/or evaluated.
3. Goals
   a. Identify the sustainability goals for the building.
   b. Note: Although applicants are required to set goals, documentation of actual achievement is not required to demonstrate compliant policies; stating the goal is enough. Applicants are encouraged to set high goals and work toward their achievement.
4. Procedures and Strategies
   a. Outline the procedures and strategies in place to meet the goals and intent of the policy.
5. Responsible Party
   a. Identify the teams and individuals involved in activities pertaining to the policy.
   b. Identify and outline key tasks for the above teams and individuals.
6. Time Period
   a. Identify the time period over which the policy is applicable.

Applicants are not required to develop separate policies for the purposes of achieving prerequisites and credits; highlighting these components in their existing operations policies is acceptable.

Facility Alterations and Additions

Although LEED for Existing Buildings: O&M focuses mainly on sustainable ongoing building operations, it also embraces sustainable alterations and new additions to existing buildings. In general parlance, alterations and additions may range from a complete gutting, major renovation or large new wing to the replacement of an old window, sheet of drywall or section of carpet.

In LEED for Existing Buildings: O&M, however, alterations and additions has a specific meaning. It refers to changes that affect usable space in the building. Mechanical, electrical or plumbing system upgrades that involve no disruption to usable space are excluded.

Only alterations and additions within the following limits are eligible for inclusion in LEED for Existing Buildings: O&M certification:

- Maximum. For alterations, those that affect no more than 50% of the total building floor area or cause relocation of no more than 50% of regular building occupants. For additions, those that increase the total building floor area by no more than 50%. Buildings with alterations or additions exceeding these limits should pursue certification under the LEED for New Construction program.
- Minimum. For alterations, projects that include construction activity by more than one trade specialty, make substantial changes to at least one entire room in the building and require isolation of the work site from regular building occupants for the duration of construction. For additions, those that increase the total building floor area by at least 5%. Alterations or additions below these limits are considered repairs, routine replacements or minor upgrades and are ineligible to earn points under LEED for Existing Buildings: O&M. The minimum applies to Materials & Resources (MR) Credits 3 and 9, and Indoor Environmental Quality (EQ) Credit 1.5.

Structure of Prerequisites and Credits

All LEED prerequisites and credits have identical structures:

- Intent: The objective of each prerequisite or credit.
- Requirements: What must be done to earn each prerequisite or credit.
- Potential Strategies and Technologies: Possible methods for achieving each prerequisite or credit. More detail on strategies, technologies and resources is provided in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

Participation and Certification Process

To apply for LEED for Existing Buildings: O&M certification of your building, register by going to the USGBC website and follow the links to the LEED section. When your project is registered, you will gain access to LEED Online and the LEED Project Team page on the USGBC website. For further information on the registration and certification process, please visit the LEED Certification Process page of the website.

Selecting the Appropriate Certification Program

The family of LEED Green Building Rating Systems™ is shown below. Only one rating system may be applicable to some projects; other projects may be applicable to two or three. Prior to registration, USGBC encourages project teams to tally the potential point totals under different rating system checklists. A project is a viable candidate for LEED certification if it can meet all prerequisites and achieve the minimum points required for a given rating system.

If you have questions or concerns pertaining to the LEED Rating Systems, please e-mail leedinfo@usgbc.org, or call 1-800-795-1747.

Contents

Project Checklist

Sustainable Sites	**9 Possible Points**
Credit 1: LEED Certified Design and Construction	1
Credit 2: Building Exterior and Hardscape Management Plan	1
Credit 3: Integrated Pest Management, Erosion Control, and Landscape Management Plan	1
Credit 4.1 - 4.4: Alternative Commuting Transportation	1
Credit 5: Reduced Site Disturbance: Protect or Restore Open Space	1
Credit 6: Stormwater Management	1
Credit 7.1: Heat Island Reduction: Nonroof	1
Credit 7.2: Heat Island Reduction: Roof	1
Credit 8: Light Pollution Reduction	1
Water Efficiency	**4 - 10 Possible Points**
Prerequisite 1: Minimum Indoor Plumbing Fixture and Fitting Efficiency	Required
Credit 1.1 and 1.2: Water Performance Measurement	1 - 2
Credit 2.1 - 2.3: Additional Indoor Plumbing Fixture and Fitting Efficiency	1 - 3
Credit 3.1 - 3.3: Water Efficient Landscaping	1 - 3
Credit 4.1 - 4.2: Cooling Tower Water Management	1 - 2
Energy & Atmosphere	**13 - 30 Possible Points**
Prerequisite 1: Energy Efficiency Best Management Practices: Planning, Documentation and Opportunity Assessment	Required
Prerequisite 2: Minimum Energy Efficiency Performance	Required
Prerequisite 3: Refrigerant Management: Ozone Protection	Required
Credit 1: Optimize Energy Efficiency Performance	2-15, 2 point mandatory
Credit 2.1: Existing Building Commissioning: Investigation and Analysis	2
Credit 2.2: Existing Building Commissioning: Implementation	2
Credit 2.3: Existing Building Commissioning: Ongoing Commissioning	2
Credit 3.1: Performance Measurement: Building Automation System	1
Credit 3.2 and 3.3: Performance Measurement: System-Level Metering	1 - 2
Credit 4.1 - 4.4: On-Site and Off-Site Renewable Energy	1 - 4
Credit 5: Refrigerant Management	1
Credit 6: Emissions Reduction Reporting	1
Materials & Resources	**9 - 14 Possible Point**
Prerequisite 1: Sustainable Purchasing Policy	Required
Prerequisite 2: Solid Waste Management Policy	Required
Credit 1.1 - 1.3: Sustainable Purchasing: Ongoing Consumables	1 - 3
Credit 2.1 and 2.2: Sustainable Purchasing: Durable Goods	1 - 2

Credit 3: Sustainable Purchasing: Facility Alterations & Additions	1
Credit 4: Sustainable Purchasing: Reduced Mercury in Lamps	1 - 2
Credit 5: Sustainable Purchasing: Food	1
Credit 6: Solid Waste Management: Waste Stream Audit	1
Credit 7.1 and 7.2: Solid Waste Management: Ongoing Consumables	1 - 2
Credit 8: Solid Waste Management: Durable Goods	1
Credit 9: Solid Waste Management: Facility Alterations & Additions	1

Indoor Environmental Quality	**16 - 20 Possible Points**
Prerequisite 1: Outdoor Air Introduction & Exhaust Systems	Required
Prerequisite 2: Environmental Tobacco Smoke (ETS) Control	Required
Prerequisite 3: Green Cleaning Policy	Required
Credit 1.1: IAQ Best Management Practices: IAQ Management Program	1
Credit 1.2: IAQ Best Management Practices: Outdoor Air Delivery Monitoring	1
Credit 1.3: IAQ Best Management Practices: Increased Ventilation	1
Credit 1.4: IAQ Best Management Practices: Reduce Particulates in Air Distribution	1
Credit 1.5: IAQ Best Management Practices: IAQ Management for Facility Alterations and Additions	1
Credit 2.1: Occupant Comfort: Occupant Survey	1
Credit 2.2: Occupant Comfort: Occupant-Controlled Lighting	1
Credit 2.3: Occupant Comfort: Thermal Comfort Monitoring	2
Credit 2.4 and 2.5: Occupant Comfort: Daylight and Views	1 - 2
Credit 3.1: Green Cleaning: High-Performance Cleaning Program	1
Credit 3.2 - 3.3: Green Cleaning: Custodial Effectiveness Assessment	1 - 2
Credit 3.4 - 3.6: Green Cleaning: Purchase of Sustainable Cleaning Products and Materials	1 - 3
Credit 3.7: Green Cleaning: Sustainable Cleaning Equipment	1
Credit 3.8: Green Cleaning: Entryway Systems	1
Credit 3.9: Green Cleaning: Indoor Integrated Pest Management	1

Innovation in Operations	**4 - 7 Possible Points**
Credit 1.1 - 1.4: Innovation in Operations	1 - 4
Credit 2: LEED® Accredited Professional	1
Credit 3: Documenting Sustainable Building Cost Impacts	2

Project Totals **85 possible base points plus 7 for IO**

- ☐ Certified 34–42 points
- ☐ Silver 43–50 points
- ☐ Gold 51–67 points
- ☐ Platinum 68–92 points

SS Credits 4.1–4.4: Alternative Commuting Transportation

1–4 points

Intent

To reduce pollution and land development impacts from conventional automobile use for commuting trips.

Requirements

Reduce the number of commuting round trips made by regular building occupants using single-occupant, conventionally powered, and conventionally fueled vehicles. For the purposes of this credit, alternative transportation includes, but is not limited to, telecommuting, compressed workweeks, mass transit, walking, bicycles or other human-powered conveyances, carpools, vanpools, and low-emitting or fuel-efficient or alternative-fuel vehicles. Performance calculations are made relative to a baseline case that assumes all regular occupants commute alone in conventional automobiles. The calculations must account for seasonal variations in the use of alternative commuting methods and, where possible, indicate the distribution of commuting trips using each type of alternative transportation.

Points are earned for reductions in conventional commuting trips during the performance period according to the following schedule:

- ❑ **SS Credit 4.1** (1 point): Demonstrate a 10% reduction in conventional commuting trips.
- ❑ **SS Credit 4.2** (2 points): Demonstrate a 25% reduction in conventional commuting trips.
- ❑ **SS Credit 4.3** (3 points): Demonstrate a 50% reduction in conventional commuting trips.
- ❑ **SS Credit 4.4** (4 points): Demonstrate a 75% reduction in conventional commuting trips.

Low-emitting vehicles and *fuel-efficient* vehicles are defined as vehicles that are classified as zero-emission vehicles (ZEVs) by the California Air Resources Board or that have achieved a minimum green score of 40 on the American Council for an Energy Efficient Economy annual vehicle-rating guide.

Potential Technologies & Strategies

When developing an alternative transportation program, consider the opportunities and limitations of different options, based on the building's location.

Provide space and infrastructure features, such as bicycle racks, changing facilities, preferred parking, access to mass transit, or alternative-fuel refueling stations. Offer employees incentives for using alternative transportation, such as additional vacation days, cash rewards, or pretax options. Distribute free or discounted public transportation passes, bicycling equipment or telecommuting equipment to individuals committed to using them. Encourage the use of alternative commuting methods by guaranteeing free rides home for employees who must unexpectedly leave work early or late. Utilize organization resources to communicate with building occupants about alternative transportation options and benefits, and facilitating communication among building occupants for coordinating ride sharing.

Water Efficiency (WE)

WE Prerequisite 1: Minimum Indoor Plumbing Fixture and Fitting Efficiency

Required

Intent

To reduce indoor fixture and fitting water use within buildings to reduce the burdens on potable water supply and wastewater systems.

Requirements

Reduce potable water usage of indoor plumbing fixtures and fittings to a level equal to or below the LEED for Existing Buildings: O&M baseline, which is calculated using the assumption that 100% of the building's indoor plumbing fixtures and fittings meet the Uniform Plumbing Codes (UPC) 2006 or International Plumbing Codes (IPC) 2006 fixture and fitting performance requirements. Fixtures and fittings included in the calculations for this credit are water closets, urinals, showerheads, faucets, faucet replacement aerators, and metering faucets.

The LEED for Existing Buildings: O&M baseline water usage is set based on the year of substantial completion of the building's indoor plumbing system, as of the time the project team assesses the building for LEED for Existing Buildings: O&M compliance. Fixture and fitting retrofits performed in order to achieve compliance with LEED for Existing Buildings: O&M will not affect the baseline usage. *Substantial completion* is defined as either initial building construction or the last plumbing renovation of all or part of the building that included a 100% retrofit of all plumbing fixtures and fittings as part of the renovation. Set the baseline as follows:

- For a plumbing system substantially completed in 1993 or later throughout the building, the baseline is 120% of the water usage that would result if all fixtures met the codes cited above.
- For a plumbing system substantially completed before 1993 throughout the building, the baseline is 160% of the water usage that would result if all fixtures met the codes cited above.

If indoor plumbing systems were substantially completed at different times for different parts of the building because the plumbing renovations occurred at different times, set a whole-building average baseline by prorating between the above limits. Prorate based on the proportion of plumbing fixtures installed during the plumbing renovations in each date period, as explained in the LEED for Existing Buildings: Operations & Maintenance Reference Guide. Pre-1993 buildings that have had only minor fixture retrofits (aerators, showerheads, flushing valves) but no plumbing renovations after 1993 may use the 160% baseline for the whole building.

Demonstrate fixture and fitting performance through calculations to compare the water use of the as-installed fixtures and fittings with the use of UPC- or IPC-compliant fixtures and fittings, as explained in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

Develop and implement a policy requiring economic assessment of conversion to high-performance plumbing fixtures and fittings as part of any future indoor plumbing renovation. The assessment must account for potential water supply and disposal cost savings and maintenance cost savings.

Potable water is water suitable for drinking that meets or exceeds EPA drinking water standards; it is supplied from wells or municipal water systems.

Potential Technologies & Strategies

Reduce indoor plumbing fixture and fitting potable water usage through automatic water control systems. Install, where possible, water-conserving indoor plumbing fixtures and fittings that meet or exceed the UPC 2006 or IPC 2006 fixture and fitting requirements in combination with high-efficiency or dry fixture and control technologies.

WE Credit 3.1–3.3: Water Efficient Landscaping

1–3 points

Intent

To limit or eliminate the use of potable water or other natural surface or subsurface resources available on or near the project site for landscape irrigation.

Requirements

Reduce potable water or other natural surface or subsurface resource consumption for irrigation compared with conventional means of irrigation. If the building does not have separate water metering for irrigation systems, the water-use reduction achievements can be demonstrated through calculations. Points are earned according to the following schedule:

- ❑ **WE Credit 3.1** (1 point): 50% reduction in potable water or other natural surface or subsurface resource use for irrigation over conventional means of irrigation.
- ❑ **WE Credit 3.2** (2 points): 75% reduction in potable water or other natural surface or subsurface resource use for irrigation over conventional means of irrigation.
- ❑ **WE Credit 3.3** (3 points): 100% reduction in potable water or other natural surface or subsurface resource use for irrigation over conventional means of irrigation.

For building site areas with no landscaped areas, points can be earned by reducing the use of potable water for watering any roof and/or courtyard garden space or outdoor planters, provided the planters and/or garden space cover at least 5% of the building site area (including building footprint, hardscape area, parking footprint, etc.). If the planters and/or garden space cover less than 5% of the building site area, the project is ineligible for this credit.

Three options are available to demonstrate compliance with the above requirements. Project teams that do not separately meter their actual irrigation water use during the performance period must choose Option B.

CHOOSE ONE OF THE FOLLOWING OPTIONS:

OPTION A

Calculate the baseline irrigation water use by determining the water use that would result from using an irrigation system typical for the region and compare this with the building's actual potable water use for irrigation, which can be determined through submetering. Use the baseline and actual water use values to calculate the percentage reduction in potable water or other natural surface or subsurface resource use. More detail about completing this calculation is available in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

OPTION B

Calculate the estimated irrigation water use by determining the landscape area for the project and sorting this area into the major vegetation types. Determine the reference Evapotranspiration Rate (ET_0) for the region and determine the Species Factor (k_s), Density Factor (k_d), and Microclimate Factor (k_{mc}) for each vegetation type. Use this information to calculate the Landscape Coefficient (K_L) and irrigation water use

for the installed case.

Calculate the baseline case irrigation water use by setting the above factors to average values representative of conventional equipment and design practices. Use the estimated and baseline case to determine the percentage reduction in potable water or other natural surface or subsurface resource use. Factor values and other resources for completing these calculations are available in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

OPTION C

Use independent irrigation performance and ranking tools available from local, regional, state, or national sources to demonstrate reductions in potable water or other natural surface or subsurface resource use for irrigation purposes. Provide information about the independent tool to demonstrate that it is technically sound.

Potable water is water suitable for drinking that meets or exceeds EPA drinking water standards; it is supplied from wells or municipal water systems.

Potential Technologies & Strategies

Specify water-efficient, climate-tolerant native or adapted plantings. Implement or maintain high-efficiency irrigation technologies, such as microirrigation, moisture sensors, or weather data-based controllers. Feed irrigation systems with captured rainwater, graywater (on-site or municipal), municipally reclaimed water, or on-site treated wastewater. Consider not operating an irrigation system. Consider use of xeriscaping principles in arid climates.

Energy & Atmosphere (EA)

EA Prerequisite 1: Energy Efficiency Best Management Practices: Planning, Documentation and Opportunity Assessment

Required

Intent

To promote continuity of information to ensure that energy-efficient operating strategies are maintained and provide a foundation for training and system analysis.

Requirements

Document the current sequence of operations for the building.

Develop a building operating plan that provides details on how the building is to be operated and maintained. The operating plan must include, at a minimum, an occupancy schedule, equipment run-time schedule, design setpoints for all HVAC equipment, and design lighting levels throughout the building. Identify any changes in schedules or for different seasons, days of the week, and times of day. Validate that the operating plan has been met during the performance period.

Develop a systems narrative that briefly describes the mechanical and electrical systems and equipment in the building. The systems narrative must include all the systems used to meet the operating conditions stated in the operating plan, including, but not limited to, heating, cooling, ventilation, lighting, and any building controls systems.

Create a narrative of the preventive maintenance plan for equipment described in the systems narrative and document the preventive maintenance schedule during the performance period.

Conduct an energy audit that meets the requirements of the ASHRAE Level I, walk-through analysis.

Potential Technologies & Strategies

Prepare a building operating plan that specifies the current operational needs of the building and identify building systems and other practices necessary to meet those needs. Outline the current sequence of operations to identify and eliminate any inefficiency.

Develop and implement a preventive maintenance program to regularly monitor and optimize the performance of mechanical equipment regulating indoor comfort and the conditions delivered in occupied spaces.

EA Prerequisite 2: Minimum Energy Efficiency Performance

Required

Intent

To establish the minimum level of operating energy efficiency performance for the building and systems.

Requirements

Earn at least two points under Energy & Atmosphere Credit 1.

Potential Technologies & Strategies

Existing building commissioning will help identify areas of building operations that are not operating efficiently. Implement energy-saving operational and management practices and/or energy-efficiency retrofits to reduce energy use to the level required to meet this prerequisite.

EA Prerequisite 3: Refrigerant Management: Ozone Protection

Required

Intent

To reduce stratospheric ozone depletion.

Requirements

Do not use CFC-based refrigerants in HVAC&R base building systems unless a third-party audit (as defined in the LEED for Existing Buildings: Operations & Maintenance Reference Guide) shows that system replacement or conversion is not economically feasible or it is demonstrated that a phase-out plan for CFC-based refrigerants is in place.

Required economic analysis: The replacement of a chiller is considered not economically feasible if the simple payback of the replacement is greater than 10 years. To determine the simple payback, divide the cost of implementing the replacement by the annual cost avoidance for energy that results from the replacement and any difference in maintenance costs. If CFC-based refrigerants are maintained in the building, reduce annual leakage to 5% or less using EPA Clean Air Act, Title VI, Rule 608 procedures governing refrigerant management and reporting and reduce the total leakage over the remaining life of the unit to less than 30% of its refrigerant charge.

Small HVAC&R units (defined as containing less than 0.5 pounds of refrigerant), standard refrigerators, small water coolers, and any other cooling equipment that contains less than 0.5 pounds of refrigerant are not considered part of the base building system and are exempt.

Potential Technologies & Strategies

Specify only non-CFC-based refrigerants in all new building HVAC&R systems. Identify all existing CFC-based refrigerant uses and upgrade the equipment if economically feasible and/or develop a phase-out plan that identifies a schedule for future replacement.

EA Credit 1: Optimize Energy Efficiency Performance
2–15 points; 2 points mandatory

Intent

To achieve an increased level of operating energy efficiency performance relative to typical buildings of similar type to reduce environmental impacts associated with excessive energy use.

Requirements

Choose one of the following options:

OPTION A

For buildings eligible to receive an EPA rating using ENERGY STAR's Portfolio Manager tool, achieve an energy performance rating of at least 69. If the building is eligible for a rating using Portfolio Manager, Option A must be used.

OPTION B

For buildings not eligible to receive an EPA rating using Portfolio Manager, demonstrate energy efficiency in at least the 19th percentile for typical buildings of similar type by benchmarking against national median source energy data provided in the Portfolio Manager tool or in USGBC's supplementary calculator as an alternative to EPA ratings. Follow the detailed instructions in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

OPTION C

For buildings not eligible to receive an EPA rating using Portfolio Manager and also not suited for Option B, use the alternative method described in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

In addition to Option A, B, or C, meet all the requirements below:

- Achieve energy efficiency performance better than the minima listed above; points are awarded according to the tables below.
- Have an energy meter(s) that measures all energy use throughout the performance period of each building to be certified. Each building's energy performance must be based on actual metered energy consumption for both the LEED project building(s) and all comparable buildings used for the benchmark.

A full 12 months of continuous measured energy data is required.

- Calibrate meters within the manufacturer's recommended interval if the building owner, management organization, or tenant owns the meter. Meters owned by third parties (e.g., utilities or governments) are exempt.

OPTION A

Epa Energy Star Rating	LEED for Existing Buildings: O&M Points
65	[illegible]
67	1
[illegible]	[illegible]
71	3
[illegible]	[illegible]
75	5
[illegible]	[illegible]
79	7
[illegible]	[illegible]
83	9
[illegible]	[illegible]
87	11
[illegible]	[illegible]

OPTION B and C

Percentile level above national median (for buildings not eligible for an EPA rating)*	LEED for Existing Buildings: O&M Points
15	[illegible]
17	1
[illegible]	[illegible]
21	3
[illegible]	[illegible]
25	5
[illegible]	[illegible]
29	7
[illegible]	[illegible]
33	9
[illegible]	[illegible]
37	11
[illegible]	[illegible]

Potential Technologies & Strategies

Existing building commissioning and energy audits will help identify areas of building operations that are not efficient. Implement energy-efficient retrofits and energy-saving techniques to reduce the building's energy use.

Choose energy-efficient office equipment, maintenance equipment, and appliances to help reduce energy waste. Use meters on major mechanical systems to monitor energy consumption.

In addition to efficiency improvements, consider renewable energy options as a way to minimize the building's environmental impact.

EA Credit 2.1: Existing Building Commissioning: Investigation and Analysis
2 points

Intent

Through a systematic process, to develop an understanding of the operation of the building's major energy-using systems, options for optimizing energy performance and a plan to achieve energy savings.

Requirements

Conduct one of the following:

OPTION A: Commissioning Process

Develop a retrocommissioning, recommissioning or ongoing commissioning plan for the building's major energy-using systems.

Conduct the investigation and analysis phase.

Document the breakdown of energy use in the building.

List the operating problems that affect occupants' comfort and energy use, and develop potential operational changes that will solve them.

List the identified capital improvements that will provide cost-effective energy savings and document the cost- benefit analysis associated with each.

OPTION B: ASHRAE Level II, Energy Audit

Conduct an energy audit that meets the requirements of ASHRAE Level II, energy survey and analysis.

Document the breakdown of energy use in the building.

Perform a savings and cost analysis of all practical measures that meet the owner's constraints and economic criteria, along with a discussion of any effect on operations and maintenance procedures.

List the identified capital improvements that will provide cost-effective energy savings and document the cost- benefit analysis associated with each.

Potential Technologies & Strategies

Based on the building operating plan and systems narrative, confirm that all building systems and equipment are functioning as appropriate according to the equipment schedule. Conduct testing and analysis to ensure that building systems and equipment are functioning correctly. Identify opportunities to make no- or low-cost capital improvements to enhance building performance.

EA Credit 2.2: Existing Building Commissioning: Implementation

2 points

Intent

To implement minor improvements and identify planned capital projects to ensure that the building's major energy-using systems are repaired, operated, and maintained effectively to optimize energy performance.

Requirements

Implement no- or low-cost operational improvements and create a capital plan for major retrofits or upgrades.

Provide training for management staff that builds awareness and skills in a broad range of sustainable building operations topics; this could include energy efficiency and building, equipment and systems operations, and maintenance.

Demonstrate the observed and/or anticipated financial costs and benefits of measures that have been implemented.

Update the building operating plan as necessary to reflect any changes in the occupancy schedule, equipment run-time schedule, design setpoints, and lighting levels.

Potential Technologies & Strategies

Implement no- and low-cost operational improvements that will immediately enhance building performance. Develop a capital plan for the completion of any major retrofits identified through the investigation and analysis phase.

EA Credit 2.3: Existing Building Commissioning: Ongoing Commissioning

2 points

Intent

To use commissioning to address changes in facility occupancy, usage, maintenance, and repair. Make periodic adjustments and reviews of building operating systems and procedures essential for optimal energy efficiency and service provision.

Requirements

Implement an ongoing commissioning program that includes elements of planning, system testing, performance verification, corrective action response, ongoing measurement, and documentation to proactively address operating problems.

Create a written plan that summarizes the overall commissioning cycle for the building by equipment or building system group. The ongoing commissioning cycle must not exceed 24 months. This plan must include a building equipment list, performance measurement frequency for each equipment item, and steps to respond to deviation from expected performance parameters.

Complete at least half of the scope of work in the first commissioning cycle (as indicated by the percentage of the plan's total budget) prior to the date of application for LEED for Existing Buildings: O&M certification. Only work completed within two years prior to application may be included to show progress in the ongoing commissioning cycle.

Update the building operating plan and/or systems narrative as necessary to reflect any changes in the occupancy schedule, equipment run-time schedule, design setpoints, lighting levels, or system specifications.

Potential Technologies & Strategies

Develop an ongoing commissioning program that addresses the ongoing changes and maintenance needs in an existing building.

EA Credit 3.1: Performance Measurement: Building Automation System
1 point

Intent

To provide information to support the ongoing accountability and optimization of building energy performance and identify opportunities for additional energy-saving investments.

Requirements

Have in place a computer-based building automation system (BAS) that monitors and controls key building systems, including, but not limited to, heating, cooling, ventilation, and lighting. Have a preventive maintenance program in place that ensures BAS components are tested and repaired or replaced according to the manufacturer's recommended interval. Demonstrate that the BAS is being used to inform decisions regarding changes in building operations and energy-saving investments.

Potential Technologies & Strategies

Install and/or maintain a BAS to automatically control key building systems. Ensure that relevant staff are adequately trained to use the system, analyze output, make necessary adjustments, and identify investment opportunities to improve energy performance.

EA Credits 4.1–4.4: On-Site and Off-Site Renewable Energy

1–4 points

Intent

To encourage and recognize increasing levels of on-site and off-site renewable energy to reduce environmental impacts associated with fossil fuel energy use.

Requirements

Over the performance period, meet some or all of the building's total energy use with on-site or off-site renewable energy systems. Points are earned according to the following table, which shows the percentages of building energy use met by renewable energy over the performance period.

Off-site renewable energy sources are defined by the Center for Resource Solutions (CRS) Green-e products certification requirements, or the equivalent. Green power may be procured from a Green-e–certified power marketer or a Green-e–accredited utility program, or through Green-e–certified tradable renewable energy certificates (RECs), or the equivalent. For on-site renewable energy that is claimed for LEED for Existing Buildings: O&M credit, the associated environmental attributes must be retained or retired and cannot be sold.

If the green power is not Green-e certified, equivalence must exist for both major Green-e program components:

1) current green power performance standards, and 2) independent, third-party verification that those standards are being met by the green power supplier over time.

Up to the four-point limit, any combination of individual actions are awarded the sum of the points allocated to those individual actions. For example, one point would be awarded for implementing 3% of on-site renewable energy, and two additional points would be awarded for meeting 50% of the building's energy load with renewable power or certificates over the performance period. Projects must submit proof of a contract to purchase RECs for a minimum of two years and must also make a commitment to purchase RECs on an ongoing basis beyond that.

Points	On-Site Renewable Energy		Off-Site Renewable Energy Certificates
1	3%		5%
2	6%	or	50%
3	9%		75%
4	12%	or	100%

Potential Technologies & Strategies

Design and specify the use of on-site nonpolluting renewable technologies to contribute to the total energy requirements of the building. Consider and employ solar, geothermal, wind, biomass (other than unsustainably harvested wood), and biogas technologies.

Purchase renewable energy or tradable renewable energy certificates to meet some or all of the building's energy requirements. Review the building's electrical consumption trends. Research power providers in the area and

select a provider that guarantees that a portion of its delivered electric power is derived from net nonpolluting renewable technologies. If the project is in an open-market state, investigate green power and power marketers licensed to provide power in that state. Grid power that qualifies for this credit originates from solar, wind, geothermal, biomass, or low-impact hydro sources.

Materials & Resources (MR)

MR Prerequisite 1: Sustainable Purchasing Policy

Required

Intent

To reduce the environmental impacts of materials acquired for use in the operations, maintenance, and upgrades of buildings.

Requirements

Have in place a sustainable purchasing policy that includes, at a minimum, product purchasing policies for the building and site addressing the requirements of MR Credit 1, Sustainable Purchasing: Ongoing Consumables. This policy must adhere to the LEED for Existing Buildings: O&M policy model (see Introduction). At a minimum, the policy must cover those product purchases that are within the building and site management's control.

Additionally, extend the sustainable purchasing policy to include product purchasing for the building and site addressing the requirements of at least one of the credits listed below. This extended policy must also adhere to the LEED for Existing Buildings: O&M policy model and specifically address the goal, scope, and performance metric for the respective credit:

❑ **MR Credit 2:** Sustainable Purchasing—Durable Goods

❑ **MR Credit 3:** Sustainable Purchasing—Facility Alterations and Additions

❑ **MR Credit 4:** Toxic Material Source Reduction—Reduced Mercury in Lamps

This prerequisite requires only policies, not ongoing actual sustainable performance.

Potential Technologies & Strategies

A sustainable purchasing policy introduces environmentally conscious purchasing into building practices. The policy needs to clearly define an objective and establish a sustainability claims verification procedure that can be replicated as necessary. Verification procedures may rely on product certifications such as Green Seal and ENERGY STAR. Take care to confirm the validity of any product certification criteria before including it in the sustainable purchasing policy. An acceptable way to achieve this prerequisite is by using the U.S. Environmental Protection Agency's Environmentally Preferable Purchasing (EPP) Program guidelines. The EPP Program information can be found on the associated website: http://www.epa.gov/epp/.

Evaluate the items that are purchased for the building, identify more environmentally friendly alternatives, and establish a policy to purchase these alternatives when economically feasible. Work with suppliers to identify sustainable products that meet the needs of the building.

MR Prerequisite 2: Solid Waste Management Policy

Required

Intent

To reduce the amount of waste and toxins that are hauled to and disposed of in landfills or incineration facilities.

Requirements

Have in place a solid waste management policy for the building and site addressing the requirements of the waste management credits listed below as well as recycling of all mercury-containing lamps. This policy must adhere to the LEED for Existing Buildings: O&M policy model (see Introduction). At a minimum, the policy must cover the waste streams that are within the building and site management's control.

❑ **MR Credit 7:** Solid Waste Management—Ongoing Consumables

❑ **MR Credit 8:** Solid Waste Management—Durable Goods

❑ **MR Credit 9:** Solid Waste Management—Facility Alterations and Additions

This prerequisite requires only policies, not ongoing actual sustainable performance.

Potential Technologies & Strategies

Evaluate the building's waste stream and establish policies to divert materials from disposal in landfills or incineration facilities by encouraging the reuse and recycling of items, where possible.

MR Credit 1.1–1.3: Sustainable Purchasing: Ongoing Consumables

1–3 points

Intent

To reduce the environmental and air quality impacts of the materials acquired for use in the operations and maintenance of buildings.

Requirements

Maintain a sustainable purchasing program covering materials with a low cost per unit that are regularly used and replaced through the course of business. These materials include, but are not limited to, paper (printing or copy paper, notebooks, notepads, envelopes), toner cartridges, binders, batteries, and desk accessories but exclude food and beverages (see MR Credit 5). For materials that may be considered either ongoing consumables or durable goods (see MR Credit 2), the project team is free to decide which category to put them in as long as consistency is maintained with MR Credit 2, with no contradictions, exclusions or double-counting. Consistency must also be maintained with MR Credit 7.

A template calculator for MR Credits 1.1–1.3 is available in the LEED for Existing Buildings: Operations & Maintenance Reference Guide. One, two, or three points are awarded to projects that achieve sustainable purchases of at least 40%, 60%, or 80%, respectively, of total purchases (by cost) over the performance period. Sustainable purchases are those that meet one or more of the following criteria:

- ❑ Purchases contain at least 10% postconsumer or 20% postindustrial material.
- ❑ Purchases contain at least 50% rapidly renewable materials.
- ❑ Purchases contain at least 50% materials harvested and processed or extracted and processed within 500 miles of the project.
- ❑ The purchases consist of at least 50% Forest Stewardship Council (FSC)–certified paper products.
- ❑ Batteries are rechargeable.

Each purchase can receive credit for each sustainable criterion met (i.e., a $100 purchase that contains both 10% postconsumer recycled content and 50% of content harvested within 500 miles of the project counts twice in the calculation, for a total of $200 of sustainable purchasing).

Ongoing consumables must be purchased during the performance period to earn points in this credit.

Potential Technologies & Strategies

When purchasing materials, supplies or equipment, specify those that meet one or more of the criteria.

The sustainable purchasing policy introduced environmentally conscious purchasing into building practices. The policy-defined objective and sustainability claims verification procedure are the guides to achieving this credit. Verification procedures may rely on product certifications such as Green Seal and ENERGY STAR. Take care to confirm the validity of any product certification criteria before including it in the sustainable purchasing policy. An acceptable way to achieve this credit is by using the U.S. Environmental Protection Agency's Environmentally Preferable Purchasing (EPP) Program guidelines. The EPP Program information can be found on the associated website: http://www.epa.gov/epp/. This credit will support the sustainable purchasing policy through implementing its requirements, and will demonstrate the project's actual, ongoing performance.

MR Credits 2.1 and 2.2: Sustainable Purchasing: Durable Goods

1–2 points

Intent

To reduce the environmental and air quality impacts of the materials acquired for use in the operations and maintenance of buildings.

Requirements

Maintain a sustainable purchasing program covering items available at a higher cost per unit and durable goods that are replaced infrequently and/or may require capital program outlays to purchase. Materials that may be considered either ongoing consumables (see MR Credit 1) or durable goods can be counted under either category provided consistency is maintained with MR Credit 1, with no contradictions, exclusions or double-counting.

Consistency must also be maintained with MR Credit 8.

- ☐ **MR Credit 2.1:** Electric-Powered Equipment. One point is awarded to projects that achieve sustainable purchases of at least 40% of total purchases of electric-powered equipment (by cost) over the performance period. Examples of electric-powered equipment include, but are not limited to, office equipment (computers, monitors, copiers, printers, scanners, fax machines), appliances (refrigerators, dishwashers, water coolers), external power adapters, and televisions and other audiovisual equipment. Sustainable purchases are those that meet one of the following criteria:
  - The equipment is ENERGY STAR labeled (for product categories with developed specifications).
  - The equipment (either battery or corded) replaces conventional gas-powered equipment. Examples include, but are not limited to, maintenance equipment and vehicles, landscaping equipment and cleaning equipment.
- ☐ **MR Credit 2.2:** Furniture. One point is awarded to projects that achieve sustainable purchases of at least 40% of total purchases of furniture (by cost) over the performance period. Sustainable purchases are those that meet one or more of the following criteria:
  - Purchases contain at least 10% post-consumer or 20% post-industrial material.
  - Purchases contain at least 70% material salvaged from off-site or outside the organization.
  - Purchases contain at least 70% material salvaged from on-site, through an internal organization materials and equipment reuse program.
  - Purchases contain at least 50% rapidly renewable material.
  - Purchases contain at least 50% Forest Stewardship Council (FSC)–certified wood.
  - Purchases contain at least 50% material harvested and processed or extracted and processed within 500 miles of the project.

Each furniture purchase can receive credit for each sustainable criterion met (i.e., a $100 purchase that contains both 10% postconsumer recycled content and 50% of content harvested within 500 miles of the project counts twice in the calculation, for a total of $200 of sustainable purchasing).

Durable goods must be purchased during the performance period to earn points in this credit.

Potential Technologies & Strategies

When purchasing materials, supplies or equipment, specify products that meet one or more of the criteria. This credit is eligible for exemplary performance if the project team uses Electronic Product Environmental Assessment Tools (EPEAT)–rated desktop computers, monitors, and notebooks.

The sustainable purchasing policy introduced environmentally conscious purchasing into building practices. The policy-defined objective and sustainability claims verification procedure are the guides to achieving this credit. Verification procedures may rely on product certifications such as Green Seal and ENERGY STAR. Take care to confirm the validity of any product certification criteria before including it in the sustainable purchasing policy. An acceptable way to achieve this credit is by using the U.S. Environmental Protection Agency's Environmentally Preferable Purchasing (EPP) Program guidelines. The EPP Program information can be found on the associated website: http://www.epa.gov/epp/. This credit will support the sustainable purchasing policy through implementing its requirements, and will demonstrate the project's actual, ongoing performance.

MR Credit 5: Sustainable Purchasing: Food

1 point

Intent

To reduce the environmental and transportation impacts associated with food production and distribution.

Requirements

Achieve sustainable purchases of at least 25% of total combined food and beverage purchases (by cost) during the performance period. Sustainable purchases are those that meet one or both of the following criteria:

- Purchases are labeled USDA Certified Organic, Food Alliance Certified, Rainforest Alliance Certified, Protected Harvest Certified, Fair Trade, or Maine Stewardship Council's Blue Eco-Label.
- Purchases are produced within a 100-mile radius of the site.

Each purchase can receive credit for each sustainable criterion met (i.e., a $100 purchase that is both USDA Certified Organic and is produced on a farm within 100 miles of the project counts twice in the calculation, for a total of $200 of sustainable purchasing).

Food or beverages must be purchased during the performance period to earn points in this credit.

Potential Technologies & Strategies

When purchasing food and beverages, specify that the items meet one or both criteria in this credit. Consider using catering companies that purchase locally grown and/or organic foods.

Indoor Environmental Quality (EQ)

EQ Prerequisite 1: Outdoor Air Introduction and Exhaust Systems
Required

Intent

To establish minimum indoor air quality (IAQ) performance to enhance indoor air quality in buildings, thus contributing to the health and well-being of the occupants.

Requirements

Choose one of the following options:

OPTION A

Modify or maintain each outside air intake, supply air fan, and/or ventilation distribution system to supply at least the outdoor air ventilation rate required by ASHRAE 62.1–2007 Ventilation Rate Procedure under all normal operating conditions.

OPTION B

If meeting ASHRAE 62.1–2007 ventilation rates is infeasible because of the physical constraints of the existing ventilation system, modify or maintain the system to supply at least 10 cubic feet per minute (cfm) of outdoor air per person under all normal operating conditions. Demonstrate through design documentation, measurements, or other evidence that the current system cannot provide the flow rates required by ASHRAE 62.1–2007 under any operating condition even when functioning properly.

Each air-handling unit in the building must comply with either Option A or Option B above. If some air-handling units can provide the outside airflow required by ASHRAE 62.1–2007 and others cannot, those that can must do so. Buildings that cannot provide at least 10 cfm per person of outside air at each air-handling unit under all normal operating conditions cannot earn this prerequisite.

Additionally, meet all the requirements below:

- Show compliance with the applicable requirement above (Option A or Option B) through measurements taken at the system level (i.e., the air-handling unit). For variable air volume systems, the dampers, fan speeds, etc. must be set during the test to the worst-case system conditions (minimum outside airflow) expected during normal ventilation operations. Each air handler must be measured; sampling of air handlers is prohibited.
- Implement and maintain an HVAC system maintenance program to ensure the proper operations and maintenance of HVAC components as they relate to outdoor air introduction and exhaust.
- Test and maintain the operation of all building exhaust systems, including bathroom, shower, kitchen, and parking exhaust systems.

Potential Technologies & Strategies

Conduct a visual inspection of outside air vents and dampers and remove any outside air vent or louver obstructions that restrict full outside air capacity from entering the distribution system. Conduct airflow monitoring to document outside air cfm. Compare measured flow with designed flow for each unit.

EQ Prerequisite 2: Environmental Tobacco Smoke (ETS) Control

Required

Intent

To prevent or minimize exposure of building occupants, indoor surfaces, and systems to environmental tobacco smoke (ETS).

Requirements

Choose one of the following options:

OPTION A

Prohibit smoking in the building and designate exterior smoking areas at least 25 feet from building entries, outdoor air intakes and operable windows.

OPTION B

Prohibit smoking in the building except in designated smoking rooms and establish negative pressure in the rooms with smoking.

Locate any exterior designated smoking areas at least 25 feet away from building entries, outdoor air intakes and operable windows.

Design indoor designated smoking room(s) to effectively contain, capture, and remove ETS from the building. At a minimum, the smoking room must be directly exhausted to the outdoors, away from air intakes and building entry paths, with no recirculation of ETS-containing air to the nonsmoking area of the building; enclosed with impermeable deck-to-deck partitions; and operated at a negative pressure compared with the surrounding spaces of at least an average of 5 Pa (0.02 inches water gauge) and a minimum of 1 Pa (0.004 inches water gauge) when the door(s) to the smoking room are closed.

Verify performance by conducting 15 minutes of measurement, with a minimum of one measurement every 10 seconds, of the differential pressure in the smoking room with respect to each adjacent area and in each adjacent vertical chase with the doors to the smoking room closed. Conduct the testing with each space configured for worst-case conditions for transport of air from the smoking room to adjacent spaces.

OPTION C

Option C is for residential buildings only.

Reduce air leakage between smoking and nonsmoking areas.

Prohibit smoking in all common areas of the building.

Locate any exterior designated smoking areas at least 25 feet away from building entries, outdoor air intakes, and operable windows opening to common areas.

Minimize uncontrolled pathways for ETS transfer between individual residential units by sealing penetrations in each unit's walls, ceilings, and floors and by sealing adjacent vertical chases. In addition, weather-strip all doors in the residential units leading to common hallways to minimize air leakage. Demonstrate acceptable sealing of residential units in two ways: 1) by a blower door test conducted in accordance with ASTM-779-

03, Standard Test Method for Determining Air Leakage Rate by Fan Pressurization, and 2) by use of the progressive sampling methodology defined in Chapter 7 (Home Energy Rating Systems, HERS Required Verification and Diagnostic Testing) of the California Residential Alternative Calculation Method Approval Manual. Residential units must demonstrate less than 1.25 square inches of leakage area per 100 square feet of enclosure area (i.e., the sum of all wall, ceiling, and floor areas).

Potential Technologies & Strategies

Prohibit smoking in the building or provide negative-pressure smoking rooms. For residential buildings, a third option is to provide very tight construction to minimize the transfer of ETS among dwelling units.

EQ Prerequisite 3: Green Cleaning Policy

Required

Intent

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems, and the environment.

Requirements

Have in place a green cleaning policy for the building and site addressing the following green cleaning credits and other requirements:

- Purchase of sustainable cleaning and hard floor and carpet care products meeting the sustainability criteria outlined in EQ Credits 3.4–3.6.
- Purchase of cleaning equipment meeting the sustainability criteria outlined in EQ Credit 3.7.
- Establishment of standard operating procedures (SOPs) addressing how an effective cleaning and hard floor and carpet maintenance system will be consistently utilized, managed, and audited. Specifically address cleaning to protect vulnerable building occupants.
- Development of strategies for promoting and improving hand hygiene, including both hand washing and the use of alcohol-based waterless hand sanitizers.
- Development of guidelines addressing the safe handling and storage of cleaning chemicals used in the building, including a plan for managing hazardous spills or mishandling incidents.
- Development of requirements for staffing and training of maintenance personnel appropriate to the needs of the building. Specifically address the training of maintenance personnel in the hazards of use, disposal, and recycling of cleaning chemicals, dispensing equipment, and packaging.
- Provision for collecting occupant feedback and continuous improvement to evaluate new technologies, procedures, and processes.

This policy must adhere to the LEED for Existing Buildings: O&M policy model (see Introduction). At a minimum, the policy must cover the green cleaning materials that are within the building and site management's control.

Potential Technologies & Strategies

Over the performance period, establish a written green cleaning policy addressing SOPs, sustainable products and equipment, chemical handling and storage, and staff training.

EQ Credit 1.1: IAQ Best Management Practices: IAQ Management Program

1 point

Intent

To enhance indoor air quality (IAQ) by optimizing practices to prevent the development of indoor air quality problems in buildings, correcting indoor air quality problems when they occur, and maintaining the well-being of the occupants.

Requirements

Develop and implement on an ongoing basis an IAQ management program based on EPA's "Indoor Air Quality Building Education and Assessment Model (I-BEAM)," EPA Reference Number 402-C-01-001, December 2002, available at http://www.epa.gov/iaq/largebldgs/i-beam/index.html.

Potential Technologies & Strategies

Operate a program to enhance IAQ by optimizing practices to prevent the development of indoor air quality problems in buildings and maintain the well-being of the occupants. Survey and evaluate building systems to identify potential IAQ problems and implement an ongoing program to prevent these problems from occurring and to maintain a high level of IAQ. Include in the program a plan for preventing moisture accumulation and mold in the building. For additional information, see the EPA website on indoor air quality, www.epa.gov/iaq/largebldgs/baqtoc.html.

EQ Credit 2.1: Occupant Comfort: Occupant Survey

1 point

Intent

To provide for the assessment of building occupants' comfort as it relates to thermal comfort, acoustics, indoor air quality, lighting levels, building cleanliness, and any other comfort issues.

Requirements

Implement an occupant comfort survey and complaint response system to collect anonymous responses about thermal comfort, acoustics, indoor air quality, lighting levels, building cleanliness, and other occupant comfort issues. The survey must be collected from a representative sample of building occupants making up at least 30% of the total occupants, and it must include an assessment of overall satisfaction with building performance and identification of any comfort-related problems.

Document survey results and corrective actions to address comfort issues identified through the surveys.

Conduct at least one occupant survey during the performance period.

Potential Technologies & Strategies

Conducting an occupant survey is a valuable tool for identifying and addressing occupants' comfort and building performance issues. Develop a plan for corrective action to address any identified problems or concerns, when 20% or more of surveyed occupants express discomfort. Alternative survey ideas are available in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

EQ Credit 2.3: Occupant Comfort: Thermal Comfort Monitoring

1 point

Intent

To support the appropriate operations and maintenance of buildings and building systems so that they continue to meet target building performance goals over the long term and provide a comfortable thermal environment that supports the productivity and well-being of building occupants.

Requirements

Have in place a system for continuous tracking and optimization of systems that regulate indoor comfort and conditions (air temperature, humidity, air speed and radiant temperature) in occupied spaces. Have a permanent monitoring system to ensure ongoing building performance to the desired comfort criteria as determined by ASHRAE 55–2004, Thermal Comfort Conditions for Human Occupancy.

The building must establish the following:

- Continuous monitoring of, at a minimum, air temperature and humidity in occupied spaces. The sampling interval cannot exceed 15 minutes.
- Periodic testing of air speed and radiant temperature in occupied spaces. Using handheld meters is permitted.
- Alarms for conditions that require system adjustment or repair. Submit a list of the sensors, zone setpoints, and limit values that would trigger an alarm.
- Procedures that deliver prompt adjustments or repairs in response to problems identified.

All monitoring devices must be calibrated within the manufacturer's recommended interval.

Potential Technologies & Strategies

Implement systematic monitoring of the actual performance of the building to the comfort criteria defined by ASHRAE 55–2004.

As appropriate, monitoring may include measurement and trending of temperatures, relative humidity, air speed, and radiant temperatures at locations selected according to their variability and effect on occupants' comfort.

EQ Credit 3.1: Green Cleaning: High-Performance Cleaning Program

1 point

Intent

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems, and the environment.

Requirements

Have in place over the performance period a high-performance cleaning program, supported by a green cleaning policy (EQ Prerequisite 3), that addresses the following:

- Appropriate staffing plan.
- Implementation of training of maintenance personnel in the hazards, use, maintenance, disposal, and recycling of cleaning chemicals, dispensing equipment, and packaging.
- Use of chemical concentrates with appropriate dilution systems to minimize chemical use wherever possible.
- Use of sustainable cleaning materials, products, equipment, janitorial paper products, and trash bags (including microfiber tools and wipes).
- Use of sustainable cleaning and hard floor and carpet care products meeting the sustainability criteria outlined in EQ Credits 3.4–3.6.
- Use of cleaning equipment meeting the sustainability criteria outlined in EQ Credit 3.7.

Potential Technologies & Strategies

Have in place over the performance period a high-performance cleaning program, supported by policy, staffing plans, standard operating procedures, and storage procedures, that address sustainable and effective cleaning and hard floor maintenance.

EQ Credits 3.2 and 3.3: Green Cleaning: Custodial Effectiveness Assessment

1–2 points

Intent

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems, and the environment, by implementing, managing, and auditing cleaning procedures and processes.

Requirements

Conduct an audit in accordance with APPA Leadership in Educational Facilities' (APPA) "Custodial Staffing Guidelines" to determine the appearance level of the facility.

- ❑ **EQ Credit 3.2** (1 point): The facility must score 3 or less.
- ❑ **EQ Credit 3.3** (2 points): The facility must score 2 or less.

More information about the audit procedures is provided in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

Potential Technologies & Strategies

Designate an individual or team to conduct a walk-through inspection of a sample of rooms in the building to evaluate the effectiveness of the cleaning program. Identify areas that fall below the owner's expected standard and make improvements to the cleaning program accordingly.

EQ Credits 3.4–3.6: Green Cleaning: Purchase of Sustainable Cleaning Products and Materials

1–3 points

Intent

To reduce the environmental impacts of cleaning products, disposable janitorial paper products, and trash bags.

Requirements

Implement sustainable purchasing for cleaning materials and products, disposable janitorial paper products, and trash bags. Cleaning product and material purchases include items used by in-house staff or outsourced service providers. One point is awarded for each 30% of the total annual purchases of these products (by cost) that meet at least one of the following sustainability criteria:

- The cleaning products meet one or more of the following standards for the appropriate category:
  - Green Seal GS-37, for general-purpose, bathroom, glass and carpet cleaners used for industrial and institutional purposes.
  - Environmental Choice CCD-110, for cleaning and degreasing compounds.
  - Environmental Choice CCD-146, for hard surface cleaners.
  - Environmental Choice CCD-148, for carpet and upholstery care.
- Disinfectants, metal polish, floor finishes, strippers or other products not addressed by the above standards meet one or more of the following standards for the appropriate category:
  - Green Seal GS-40, for industrial and institutional floor care products.
  - Environmental Choice CCD-112, for digestion additives for cleaning and odor control.
  - Environmental Choice CCD-113, for drain or grease traps additives.
  - Environmental Choice CCD-115, for odor control additives.
  - Environmental Choice CCD-147, for hard floor care.
  - California Code of Regulations maximum allowable VOC levels for the specific product category.
- Disposable janitorial paper products and trash bags meet the minimum requirements of one or more of the following programs for the applicable product category:
  - U.S. EPA Comprehensive Procurement Guidelines for Janitorial Paper and Plastic Trash Can Liners.
  - Green Seal GS-09, for paper towels and napkins.
  - Green Seal GS-01, for tissue paper.
  - Environmental Choice CCD-082, for toilet tissue.
  - Environmental Choice CCD-086, for hand towels.
  - Janitorial paper products derived from rapidly renewable resources or made from tree-free fibers.

- Hand soaps meet one or more of the following standards:
  - No antimicrobial agents (other than as a preservative) except where required by health codes and other regulations (i.e., food service and health care requirements).
  - Green Seal GS-41, for industrial and institutional hand cleaners.
  - Environmental Choice CCD-104, for hand cleaners and hand soaps.

The materials and products described above must be purchased during the performance period to earn points in this credit.

Potential Technologies & Strategies

When purchasing materials or supplies, specify that they meet one or more of the sustainability criteria.

EQ Credit 3.7: Green Cleaning: Sustainable Cleaning Equipment

1 point

Intent

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems and the environment, from powered cleaning equipment.

Requirement

Implement a program for the use of janitorial equipment that reduces building contaminants and minimizes environmental impact. The cleaning equipment program must require the following:

- Vacuum cleaners are certified by the Carpet and Rug Institute "Green Label" Testing Program for vacuum cleaners and operate with a sound level of less than 70dBA.
- Carpet extraction equipment used for restorative deep cleaning is certified by the Carpet and Rug Institute's "Seal of Approval" Testing Program for deep-cleaning extractors.
- Powered floor maintenance equipment, including electric and battery-powered floor buffers and burnishers, is equipped with vacuums, guards and/or other devices for capturing fine particulates and operates with a sound level of less than 70dBA.
- Propane-powered floor equipment has high-efficiency, low-emissions engines with catalytic converters and mufflers that meet the California Air Resources Board (CARB) or Environmental Protection Agency (EPA) standards for the specific engine size and operate with a sound level of less than 90dBA.
- Automated scrubbing machines are equipped with variable-speed feed pumps and on-board chemical metering to optimize the use of cleaning fluids.
- Battery-powered equipment is equipped with environmentally preferable gel batteries.
- Powered equipment is ergonomically designed to minimize vibration, noise, and user fatigue.
- Equipment is designed with safeguards, such as rollers or rubber bumpers, to reduce potential damage to building surfaces.

Keep a log for all powered cleaning equipment to document the date of equipment purchase and all repair and maintenance activities and include vendor specification sheets for each type of equipment in use.

Potential Technologies & Strategies

Develop, implement, and maintain a policy for the use of low-impact powered cleaning equipment. Evaluate the powered cleaning equipment currently being used and make a plan for upgrading to powered cleaning equipment that reduces building contaminants and minimizes environmental impact.

EQ Credit 3.8: Green Cleaning: Entryway Systems

1 point

Intent

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants, which adversely affect air quality, human health, building finishes, building systems, and the environment.

Requirements

Utilize entryway systems (grilles, grates, mats) to reduce the amount of dirt, dust, pollen and other particles entering the building at all public entryways, and develop the associated cleaning strategies to maintain those entryway systems as well as exterior walkways. At least 10 feet of mats must be in place immediately inside all public entryways. Public entryways that are not in use or serve only as emergency exits are excluded from the requirements, as are private offices.

Potential Technologies & Strategies

Use grilles, grates, or mats to catch and hold dirt particles and prevent contamination of the building interior.

Design exterior stone, brick, or concrete surfaces to drain away from public building entrances.

At public building entrances, install low-maintenance vegetation within the landscape design and avoid plants, including trees and shrubs, that produce fruit, flowers, or leaves that are likely to be tracked into the building. Base plant selection on an integrated pest management (IPM) approach to eliminate pesticide applications that could be tracked into the building.

Provide a water spigot and electrical outlet at each building entrance for maintenance and cleaning.

EQ Credit 3.9: Green Cleaning: Indoor Integrated Pest Management

1 point

Intent

To reduce the exposure of building occupants and maintenance personnel to potentially hazardous chemical, biological, and particulate contaminants that adversely affect air quality, human health, building finishes, building systems, and the environment.

Requirement

Develop, implement, and maintain an indoor integrated pest management (IPM) plan, defined as managing indoor pests in a way that protects human health and the surrounding environment and that improves economic returns through the most effective, least-risk option. IPM calls for using least-toxic chemical pesticides, minimum use of chemicals, use only in targeted locations, and use only for targeted species. IPM requires routine inspection and monitoring. The plan must include the following elements, integrated with any outdoor IPM plan used for the site as appropriate:

- Integrated methods, site or pest inspections, pest population monitoring, evaluation of the need for pest control and one or more pest control methods, including sanitation, structural repairs, mechanical, and living biological controls, other nonchemical methods, and if nontoxic options are unreasonable and have been exhausted, a least-toxic pesticide.
- Specification of the circumstances under which an emergency application of pesticides in a building or on surrounding grounds being maintained by building management can be conducted without complying with the earlier provisions.
- A communications strategy directed to building occupants that addresses universal notification, which requires notice of not less than 72 hours before a pesticide under normal conditions and 24 hours after application of a pesticide in emergency conditions, other than a least-toxic pesticide, is applied in a building or on surrounding grounds that the building management maintains.

Any cleaning products included in the integrated pest management policy must meet the requirements for EQ Credits 3.4–3.6.

Potential Technologies & Strategies

Use IPM, a safer and usually less costly option for effective pest management. An IPM program employs commonsense strategies to reduce sources of food, water, and shelter for pests in buildings and on the grounds and minimizes the use of pesticides.

Innovation Credit 2: LEED® Accredited Professional

1 point

Intent

To support and encourage the operations, maintenance, upgrade, and project team integration required for LEED

for Existing Buildings: O&M implementation and to streamline the application and certification process.

Requirements

At least one principal participant of the project team must be a LEED Accredited Professional.

Potential Technologies and Strategies

Engage a LEED Accredited Professional within the organization.

Have someone in your organization study for and successfully complete the LEED professional accreditation exam.

Hire a LEED Accredited Professional to support the project. Consider selecting a LEED Accredited Professional experienced with sustainable best practices in the operations and maintenance of existing buildings.

Innovation Credit 3: Documenting Sustainable Building Cost Impacts

2 points

Intent

To document sustainable building cost impacts.

Requirements

Document overall building operating costs for the previous five years (or length of building occupancy, whichever is shorter) and track changes in overall building operating costs over the performance period. Document building operating costs and financial impacts of all aspects of LEED for Existing Buildings: O&M implementation on an ongoing basis. Follow the detailed instructions in the LEED for Existing Buildings: Operations & Maintenance Reference Guide.

Potential Technologies & Strategies

Track building operating costs to identify any positive impacts related to the sustainable performance improvements to the building and its operations.

ID Credit 3: The School as a Teaching Tool
1 Point

Intent

Integrate the sustainable features of a school facility with the school's educational mission.

Requirements

Design curriculum based on the high performance features of the building, and commit to implementing the curriculum within 10 months of LEED certification. The curriculum should not just describe the features themselves, but explore the relationship between human ecology, natural ecology and the building. Curriculum must meet local or state curriculum standards, be approved by school administrators and provide 10 or more hours of classroom instruction per year, per full-time student.

Potential Technologies & Strategies

It is highly recommended that project teams coordinate closely with school administration and faculty where possible, to encourage ongoing relationships between high-performance features of the school and the students.

For curriculum development, engage the school in a program that integrates the school building with the curriculum in the school. Consider the National Energy Education Development (NEED) Project, the Alliance to Save Energy's Green Schools Program, and National Energy Foundation educational resources. A collection of energy education resources can also be found at the Energy Information Agency's website at: www.eia.doe.gov/kids/onlineresources.html.

APPENDIX J

REQUEST FOR ENERGY ASSISTANCE

REQUEST FOR ENERGY ASSISTANCE

Energy efficiency is increasingly important for our local communities and the state of Texas. It reduces costs, increases available capital, spurs economic growth, improves working, learning and living environments and preserves precious resources. The State Energy Conservation Office (SECO) offers a number of **free and cost shared** programs and services to help public agencies establish and achieve their energy efficiency goals.

SECO through its engineering consultants offers public agencies the following free or cost shared energy management services:

• On-Site Energy Assessments Of Facilities	Free
• Senate Bill 12 and House Bill 3693 Assistance	Free
• On-Site Training For Maintenance And Operations Personnel	Free
• Workshops For Energy Managers, Maintenance Personnel And Administrators	Free
• Energy Efficiency Programs For Students and Teachers	Free
• Energy Master Planning	50% Cost Shared
• Energy Management Policy Development And Implementation	Free
• Assistance In Identifying Energy Retrofit Funding Sources	Free

Specific responsibilities of the partner and SECO in this agreement:

- Partner will select a contact person to work with SECO and its engineering consultant to establish an energy policy and set realistic energy efficiency goals.
- SECO's contractor will contact partners to assess their energy management needs.
- SECO will provide a report, which identifies no cost/low cost recommendations, capital retrofit projects, potential sources of funding and other needs and opportunities.
- Partner will schedule a time for SECO's contractor to present its findings and recommendations to key decision makers.
- Partner pledges that it is ready and willing to consider implementing the energy saving recommendations.

Acceptance Of Agreement And Request For Energy Management Assistance

Signature: Rebecca Garcia
Name (Mr./(Ms.)/Dr.) Rebecca Garcia
Organization: Lackland ISD
Address: 2460 Kenly Ave. #8265
San Antonio, TX 78236

Date: 9/15/08
Title: Business Manager
Phone: 210 357 5005
Fax: 210 357 5050
E-mail: garcia.r@lacklandisd.net

Assigned Program Person:

Name: SAME as above
Phone: _____
Fax: _____

Title: _____
County: _____
E-Mail: _____

Please complete and mail or fax to the following SECO Consultant : Texas Energy Engineering Services, Inc. (TEESI), ATTENTION: Saleem Khan / Ernie Moore, 1301 Capital Of Texas Highway #B-325, Austin, TX. 78746, Phone 512-328-2533, **Fax 512-328-2544.** If you need to contact the State Energy Conservation Office, please call **Glenda Baldwin At 512-463-1731** or you may write to her at: Comptroller Of Public Accounts, State Energy Conservation Office, 111 E. 17th Street, Austin, Texas 78774.